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PIC/JR-1010/61
April 1961

JOINT PHOTOGRAPHIC INTELLIGENCE REPORT

ADVISORY SECRETARY TALLA

ANTIMISSILE COMPLEX

SARY SHAGAN, USSR

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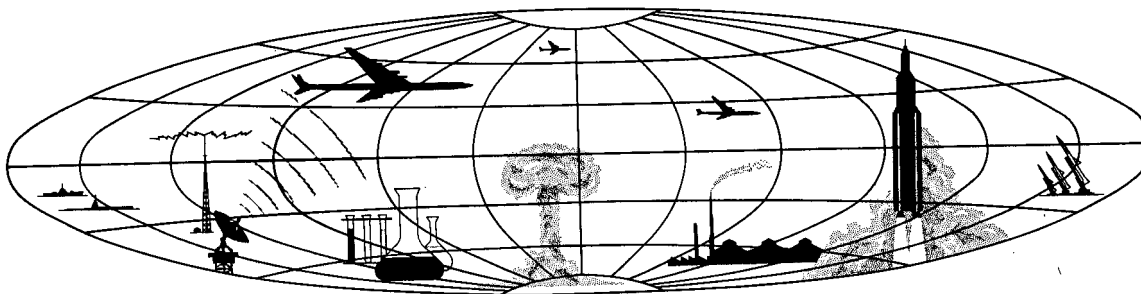
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PREFACE

This report presents a detailed photographic analysis of the Anti-missile Complex, Sary Shagan, USSR, in response to general requirements of the Army, Navy, and CIA.

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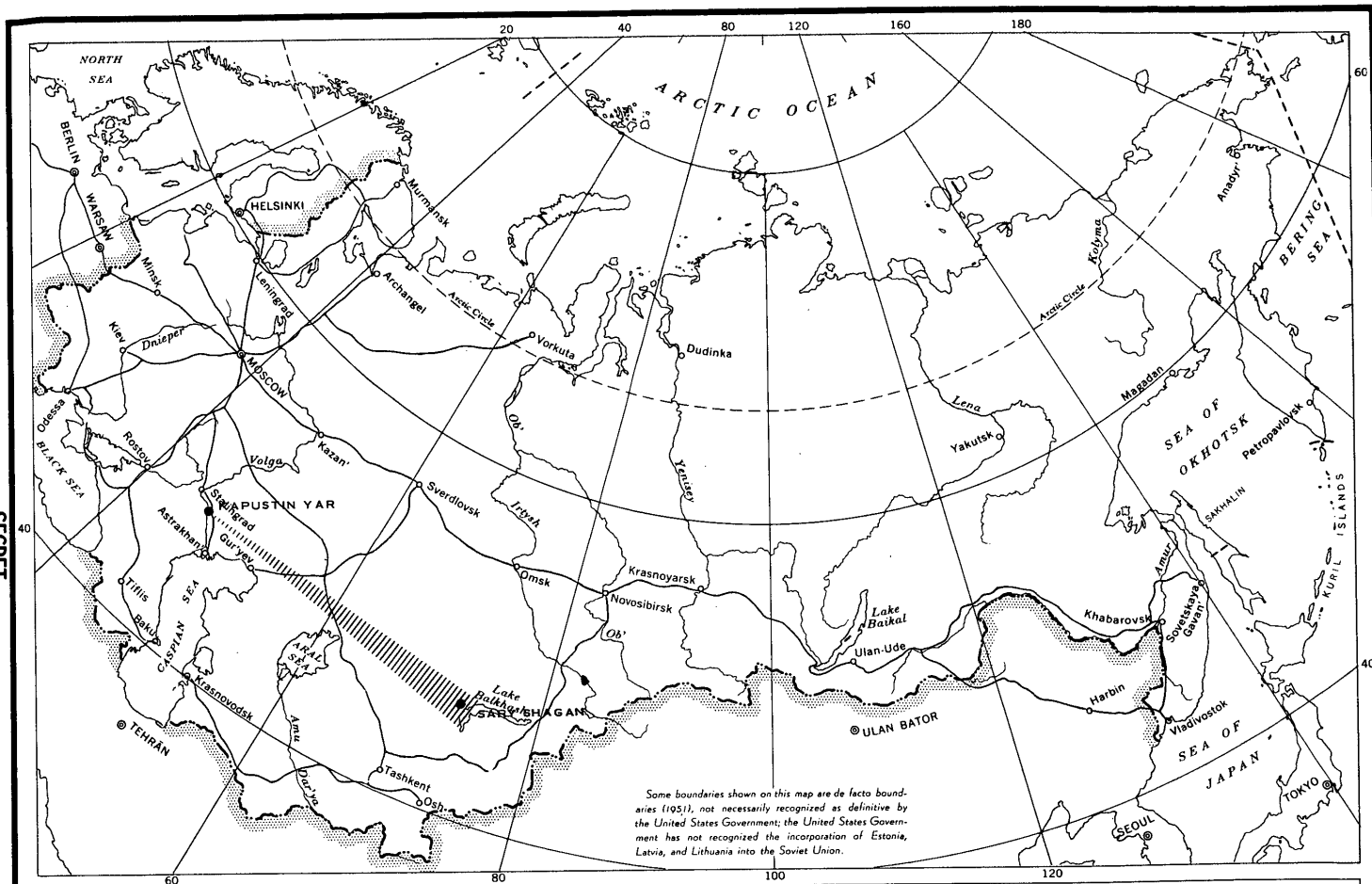
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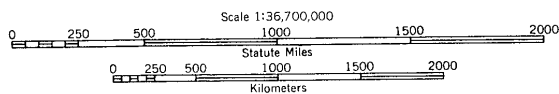
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FIGURE 1. MAP SHOWING LOCATION OF ANTIMISSILE COMPLEX, SARY SHAGAN, USSR.



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SUMMARY

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The Sary Shagan Antimissile Complex, covered by photography of [REDACTED] encompasses roughly 8,400 square miles, extending from the west shore of Lake Balkhash to a point approximately 70 miles west of the lake (see Figure 1). The complex comprises a large Support Base and an extensive instrumented Impact Area (see Figure 2). The Support Base includes housing, test, fabrication, explosives-storage and handling, construction support, and electronics facilities. The base is served by excellent rail and road facilities as well as by a new airfield. The Impact Area is so-called because it contains, in one of its two missile launch complexes, an SA-2-type site and a great amount and variety of precision instrumentation and other electronics facilities, three of which form a triangular pattern. Although none of the Impact Area facilities is rail served, each is served by road. Many of the facilities in the antimissile complex are under construction or are of recent construction.

Among USSR missile test centers, the Sary Shagan complex is second in overall size only to the Kapustin Yar-Vladimirovka Missile Test Range. On the basis of 150 square feet per man and one worker per family, the housing can accommodate 11,000 workers. It is evident that a tremendous amount of materiel and manpower was used to have completed as much as has been identified on the photography, and in what appears to have been a relatively short time.

In view of the location of the Sary Shagan complex with respect to Kapustin Yar, the types of electronics equipment noted, the presence of launch facilities, and the accommodations for large numbers of personnel, it is apparent that an intensive program is under way at the complex which relates to anti-ballistic-missile/aerodynamic vehicle activity as well as to normal terminal-range activity. Also, it is significant that Sary Shagan has direct communications with both Moscow and Kapustin Yar.

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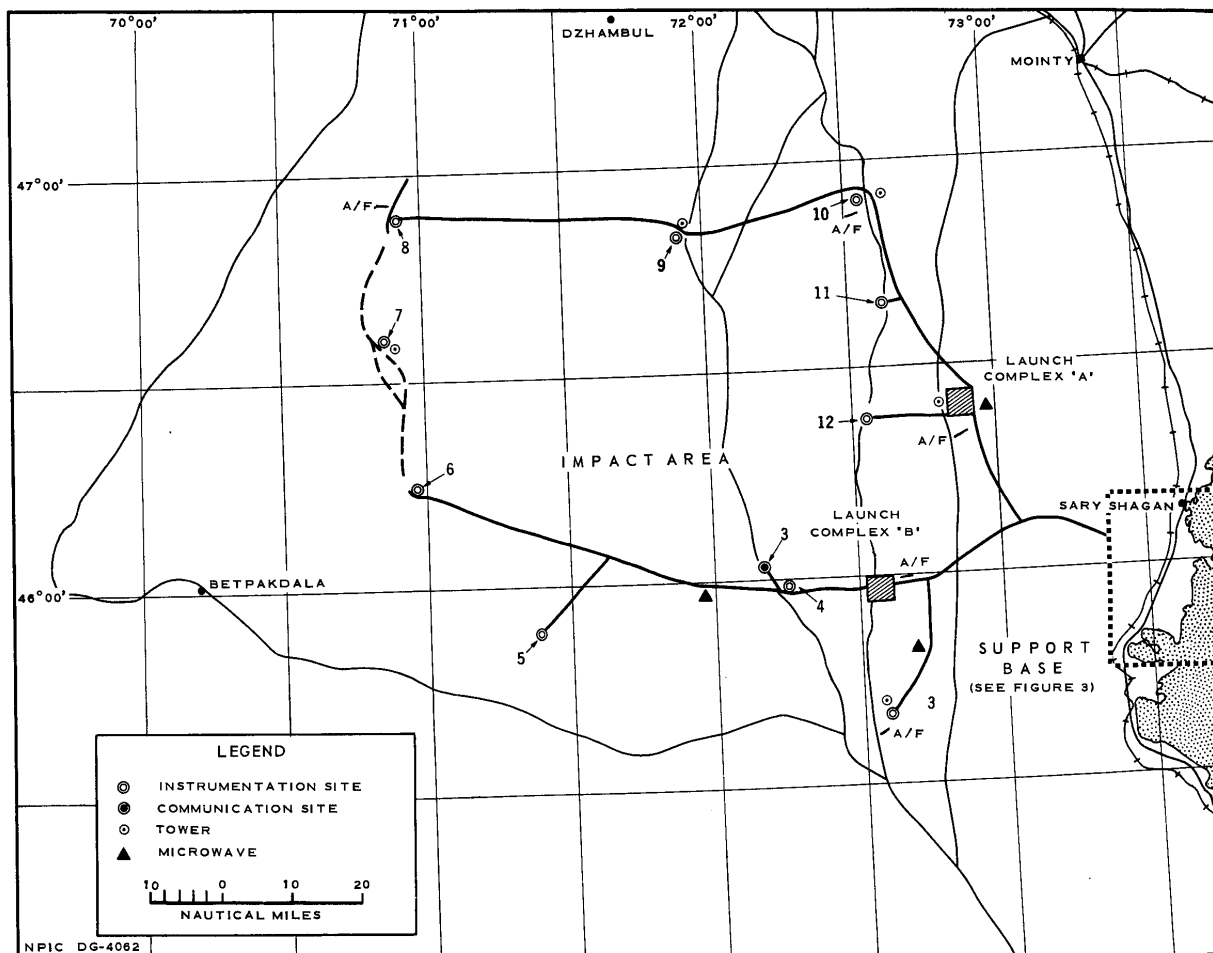


FIGURE 2. ANTIMISSILE COMPLEX, SARY SHAGAN, USSR. The Complex comprises the Support Base and the Impact Area.

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INTRODUCTION

The analysis of the Sary Shagan Antimissile Complex in this report is based on photography of [REDACTED] covering an area west of Lake Balkhash near Sary Shagan, USSR, which appears to be a terminal of the Kapustin Yar-Vladimirovka Missile Test Range. In view of the cloud cover of more than half the complex, other major facilities besides those described in this report may exist. Also, several of the areas discussed appear only on oblique photography and are completely cloud covered on the vertical. This report includes only such mensural data as thought necessary for present needs and for use in the event of future coverage. For convenience of presentation, the facilities of the complex are discussed under two major headings: Support Base and Impact Area.

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SUPPORT BASE

The Support Base is west of Lake Balkhash near the village of Sary Shagan (see Figure 3). The base, which is of relatively new construction, is served by the main rail line (from Mointy to Chu) and several sidings, a good road network, and a new airfield. In the base are a housing area; an initial support area; a test, fabrication, support, and warehouse area; an explosives-storage and handling area; a construction support and storage area; an airfield and dirt strip; and power, transportation, and electronics facilities. Each of these items is treated in detail on the following pages.

As with most relatively new projects, no attempt has been made to formalize or beautify the Support Base. Tracks and scars cut the base in every direction, giving the appearance of intense activity. At the time of photography, over 70 trucks and miscellaneous vehicles were moving throughout the base between borrow pits and scenes of construction activity. From the number of varied facilities, it appears that the base may

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have additional missions not specifically in support of the terminal-range activity. The Fabrication Facility is the best example of this; as stated below, this facility may be associated with the assembly of missiles to be used elsewhere.

Main Housing Area

This area, containing the major portion of the housing in the Support Base, is located at 46-02N 73-41E. The facilities consist of barracks, apartments, family-type housing, a recreation site, warehouses, and three motor pools (see Figure 4). Part of the area was in use at least 6 months before the date of photography.

It appears that this area was designed to house personnel permanently assigned to the Support Base. Housing in other areas of the base probably accommodates workers who are associated with specific facilities and would be required to have quarters near their work.

There are 1,835 family units and additional barracks space for 342 persons in the area. Thus the number of workers, based on one worker per family group, is 2,177. A total of 326 buildings, with a total floor space of 1,552,000 square feet, are devoted to personnel housing in the area. Warehousing, heavily vented and partially buried, has been constructed for foodstuffs, and is served by road and rail.

The three motor pools contain repair shops and other miscellaneous buildings. Approximately six buses are noted which may be used to transport personnel to the other facilities within the Support Base and to the range area. At least 232 trucks and other vehicles have been identified in the motor pools. In addition, the Main Housing Area has 20 probable administrative buildings.

Initial Support Area

The Initial Support Area is located in the northern part of the Support

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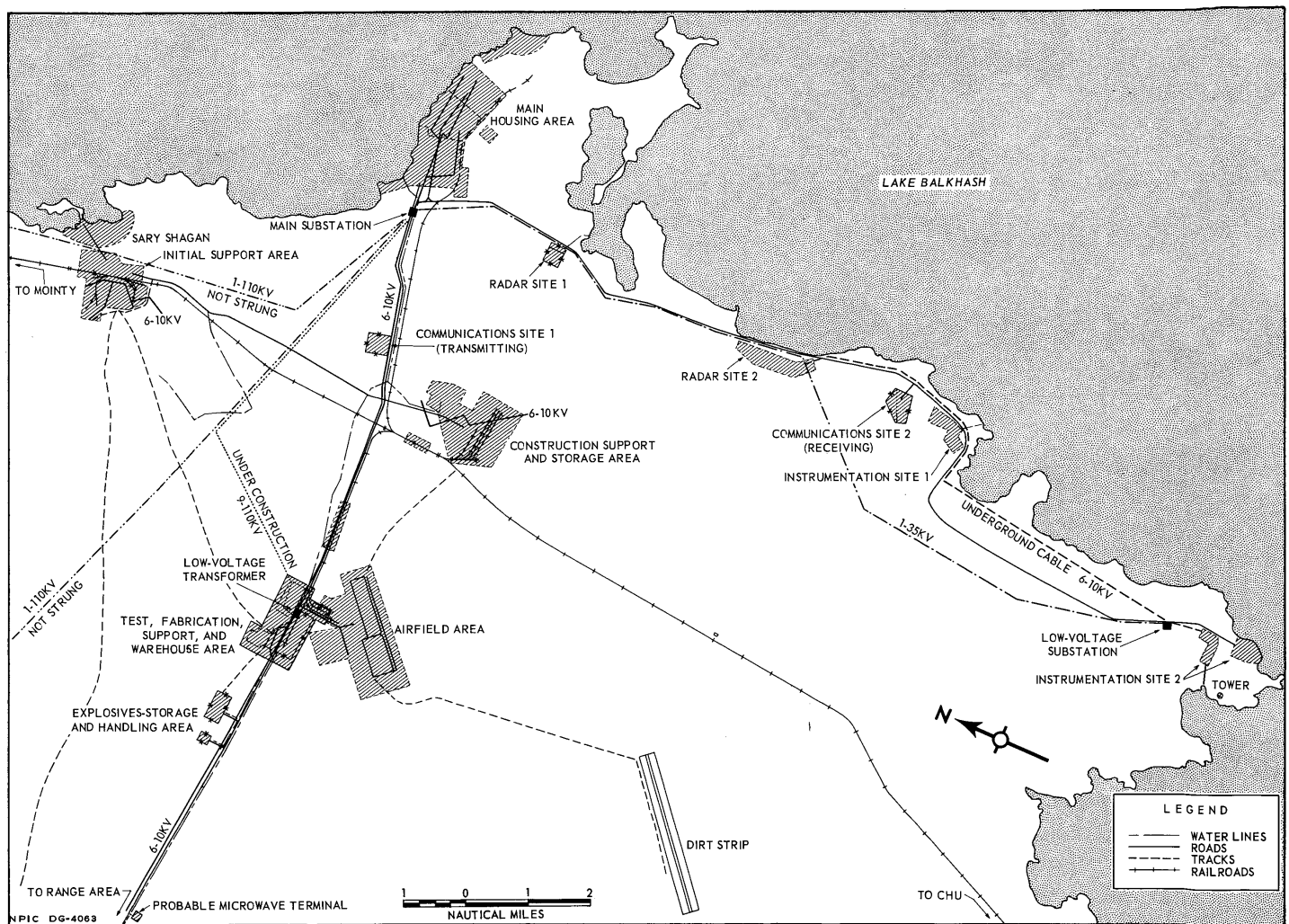


FIGURE 3. SUPPORT BASE. This shows the location of the major facilities in the base.

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Base at 46-07N 73-37E. It straddles the Mointy-Chu rail line and is serviced by an all-weather road. The area includes a large housing and support facility, a sawmill and lumberyard, a site for storage of heavy construction materials, two open storage sites (labeled A and B), a locomotive maintenance and repair facility, a POL storage site, two motor pools, and numerous warehouses (see Figure 5). This area appears to be the oldest in the Sary Shagan complex.

The housing and support facility contains sufficient family-type quarters for approximately 250 families. A few troop barracks, in the operational portion of the facility, could house approximately 350 men.

The sawmill and lumberyard cover approximately 35 acres. Besides the sawmill (120 by 55 feet), there are six miscellaneous buildings, the average floor space of which is 1,900 square feet. Logs are brought in by rail, dumped from the spur serving the area, and then processed through the sawmill.

The heavy construction materials storage site covers approximately 60 acres and is served by a rail spur. The site apparently has three storage sections: one for pipe, one for structural steel, and one for cement and other building materials requiring covered storage. The pipe-storage section is the largest of the three, comprising almost half the total acreage of the site. A mobile crane of approximately 5 to 10 tons capacity, a pipe trailer, and many racks of pipe are located in the section. The steel-storage section covers approximately one fourth of the site and contains a considerable amount of structural steel and a gantry crane of approximately 50 tons capacity. The cement and miscellaneous storage section contains seven buildings constructed along the rail spur which serves both this section and the steel-storage section. The total warehouse floor space of the site is approximately 65,000 square feet.

Open storage site A covers approximately 25 acres and is served by a rail spur. There are seven buildings with a total floor space of approximately 50,000 square feet. Stored in the site are many small items, the sizes of which preclude identification; however, in one part of the site are



FIGURE 4. MAIN HOUSING AREA. This area can accommodate 2,177 workers.

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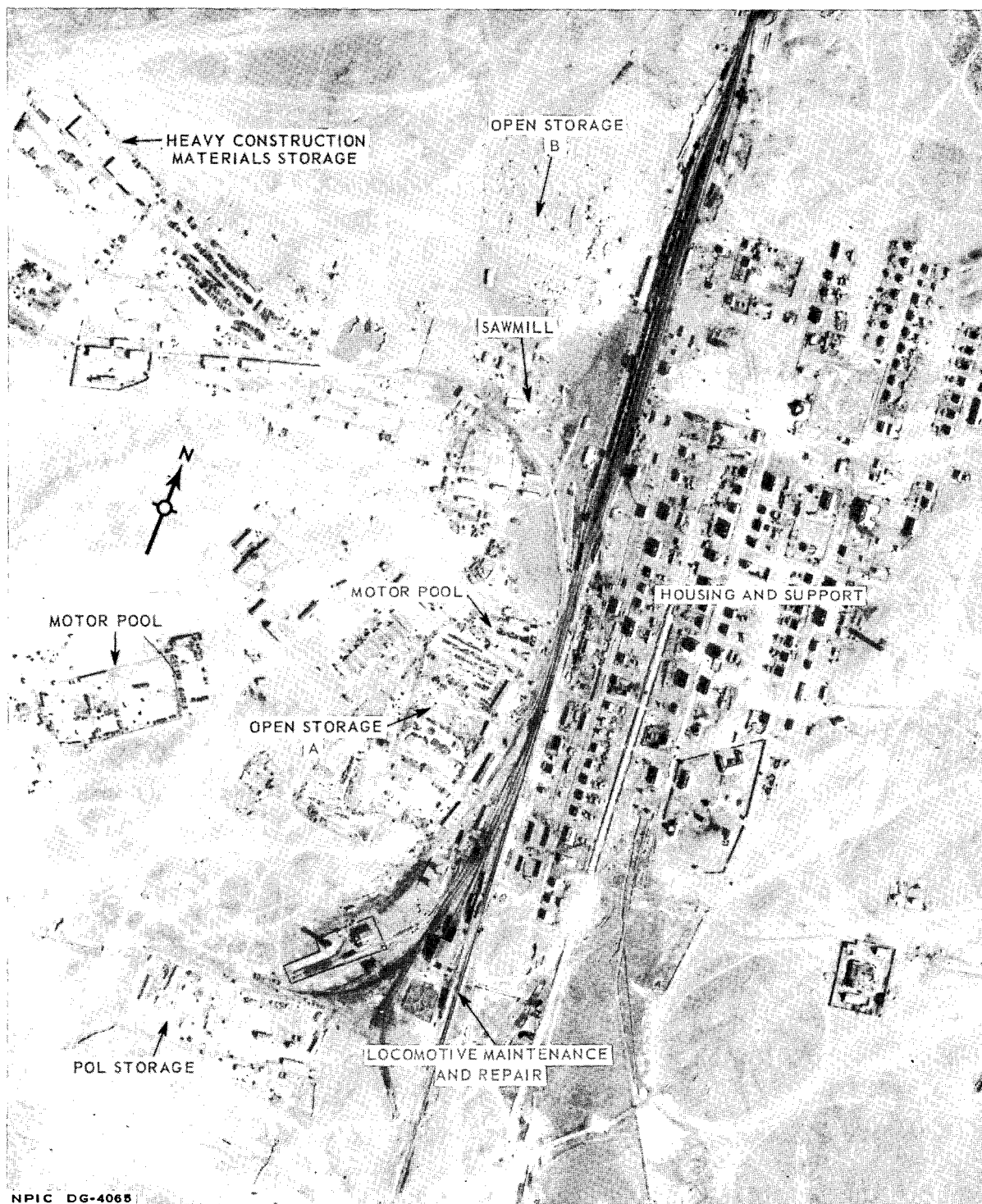


FIGURE 5. INITIAL SUPPORT AREA. Facilities include housing, storage sites, motor pools, and other support installations.

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objects which look like oil drums. Site B, covering approximately 40 acres, is adjacent to a siding of the rail line. It has no structures but has a large amount of materiel in storage.

The locomotive maintenance and repair facility includes a repair building, a diesel refueling point, and a coaling point. The facility can do normal maintenance and minor repairs. The POL storage site covers approximately 15 acres and is served by rail. This site contains five buildings with a total floor space of 16,000 square feet and 17 possible POL trucks or truck trailers. Total storage capacity is approximately 645,000 gallons.

The largest of the two motor pools covers approximately 15 acres. Its six major structures have a combined floor space of approximately 20,000 square feet. Parked in the motor pool are 58 dump trucks, 44 cargo trucks, and one possible van. The smaller motor pool, adjacent to the rail line, covers approximately 3 acres. It contains two buildings, with a total floor space of approximately 15,000 square feet, and 8 dump trucks and 43 cargo trucks.

At least 35 additional miscellaneous storage buildings are located throughout the Initial Support Area. These buildings range in size from approximately 25 by 25 feet to 130 by 40 feet. A small diesel power plant is also located in the area.

Test, Fabrication, Support, and Warehouse Area

This area is located at 46-03N73-29E, north of the airfield and astride the road which connects the Support Base to the downrange facilities. The area contains four major, separately fenced facilities -- the Probable Cold-Flow Test Facility, Fabrication Facility, Support Facility, and Warehouse Facility -- and an adjoining Engineer Support Facility and Family Housing Facility (see Figure 6). The area is probably involved in the assembly of a missile or missile components, which may be used in the Sary Shagan Antimissile Complex. If this is true, the components are

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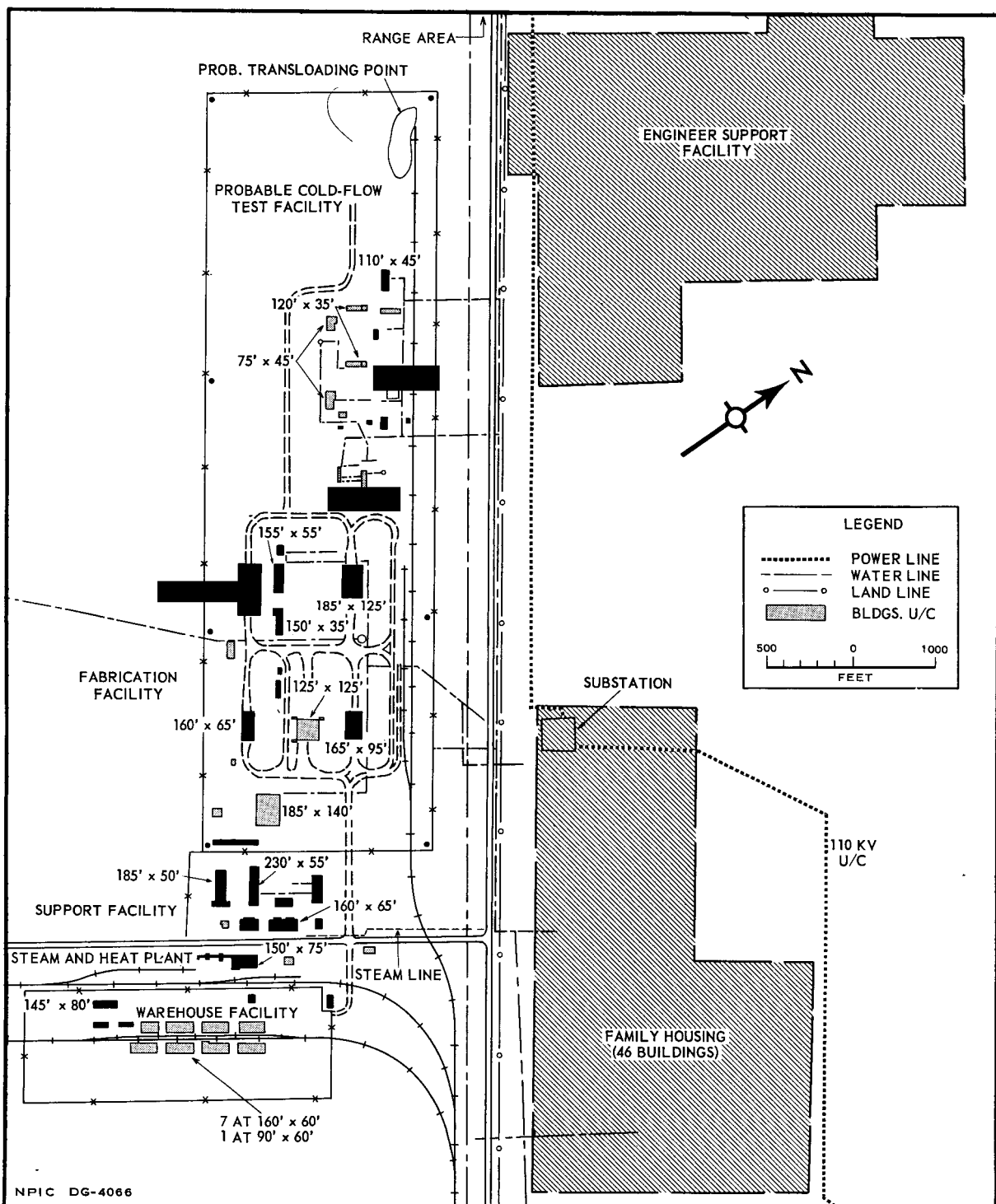


FIGURE 6. TEST, FABRICATION, SUPPORT, AND WAREHOUSE AREA. This area is probably used for missile assembly.

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brought in by rail, air, or both. However, it is possible that a missile being assembled here is completely divorced from other observed facilities in the complex and that the function of this area is to assemble missiles that have been developed and tested elsewhere and that will be used at other sites in the USSR. East of the area is a large motor pool containing 11 tank trucks and 100 cargo-type vehicles.

Probable Cold-Flow Test Facility

This facility was under construction at the time of photography. It is characterized by extensive pipelines under construction throughout. Two buildings, 120 by 35 feet with a 35-foot-square end section [REDACTED] high, are probably used for cold-flow testing of liquid-propellant rocket engines. Two other buildings, which measure 75 by 45 feet, appear to have load-bearing walls, indicating the possible use of a crane. These buildings may be used for some type of subassembly. The function of the other buildings under construction within the facility cannot be determined at present. This facility has two connections to the main water line. The pipelines being constructed are probably for some type of liquid, since they do not appear to be steam lines. A rail spur running into the facility is under construction and has a probable transloading platform at the terminus of the spur. No road pattern can be determined, owing to the construction and extensive scarring.

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Fabrication Facility

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Within this facility are five drive-through buildings varying in size from [REDACTED] to 125 by 125 feet. One of these is a hangar-type building with sliding doors which permit an opening of about 50 feet. These drive-through buildings are served by broad roads with wide-radius turns. There are three other major buildings within the facility. A rail spur

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enters the facility and continues into the Probable Cold-Flow Test Facility. A transloading point adjacent to the drive-through buildings contains two overhead cranes which extend over both the rail spur and the road serving the drive-through buildings. The single combination entrance and exit provides for good connection with the Warehouse Facility, the airfield, and the road west into the range area.

Support Facility

This facility is adjacent to the main road to the airfield and between the fabrication and warehouse facilities. It contains eight buildings which probably serve as shops, maintenance buildings, laboratories, and other types of support buildings. Across the road from this facility is a large steam and heat plant which will probably serve the adjacent facilities.

Warehouse Facility

This facility, which is under construction, will contain at least ten warehouses and several other support buildings. It is both road and rail served. When completed, this facility will provide over 85,000 square feet of covered floor space.

Engineer Support Facility

This facility includes a housing section, a support section, and two separately fenced motor pools. The housing section contains 17 single-story barracks which can accommodate approximately 600 workers. The support section has 15 buildings which provide storage, supply, recreational, messing, and other types of support. One motor pool has one large building and 15 vehicles or trailers and is characterized by extensive track activity. The second motor pool has 5 buildings, probably used for maintenance, and approximately 70 vehicles or trailers.

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Family Housing Facility

This facility contains 20 apartment buildings, which have space for 590-600 families, and 26 additional buildings which provide storage, maintenance, recreational, and other types of support. Adjacent to the facility is a small motor pool which contains one building and 40 vehicles or trailers.

Explosives-Storage and Handling Area

West of the Test, Fabrication, Support, and Warehouse Area and north of the range road, at 46-04N 73-27E, is the Explosives-Storage and Handling Area, which consists of two separate, double-fenced facilities containing 12 revetted storage/handling buildings and 3 unrevetted buildings (see Figure 7). The smaller facility is provided with power from a low-voltage 10/6-kilovolt power line extending from the substation near the Main Housing Area. The larger facility is not tied in with this power line, but has an adjacent diesel power source. These facilities are similar to those at the Surface-to-Air Missile (SAM) Facilities at Kapustin Yar. However, the Sary Shagan facilities have 51,300 square feet of covered area as opposed to 22,772 square feet for those at Kapustin Yar.

Since the Test, Fabrication, Support, and Warehouse Area is under construction, and since neither of the launch complexes contains any extensive explosives-storage facilities, it is possible that these storage and handling facilities are being used to store explosive items used on the ranges. In addition, one or both of these facilities could perform solid-propellant fabrication. The physical relationship between the Fabrication Facility and the Explosives-Storage and Handling Area suggests that an item will be assembled in the Fabrication Facility, mated with explosive components in the storage and handling area, and transported to the launch complexes for utilization.

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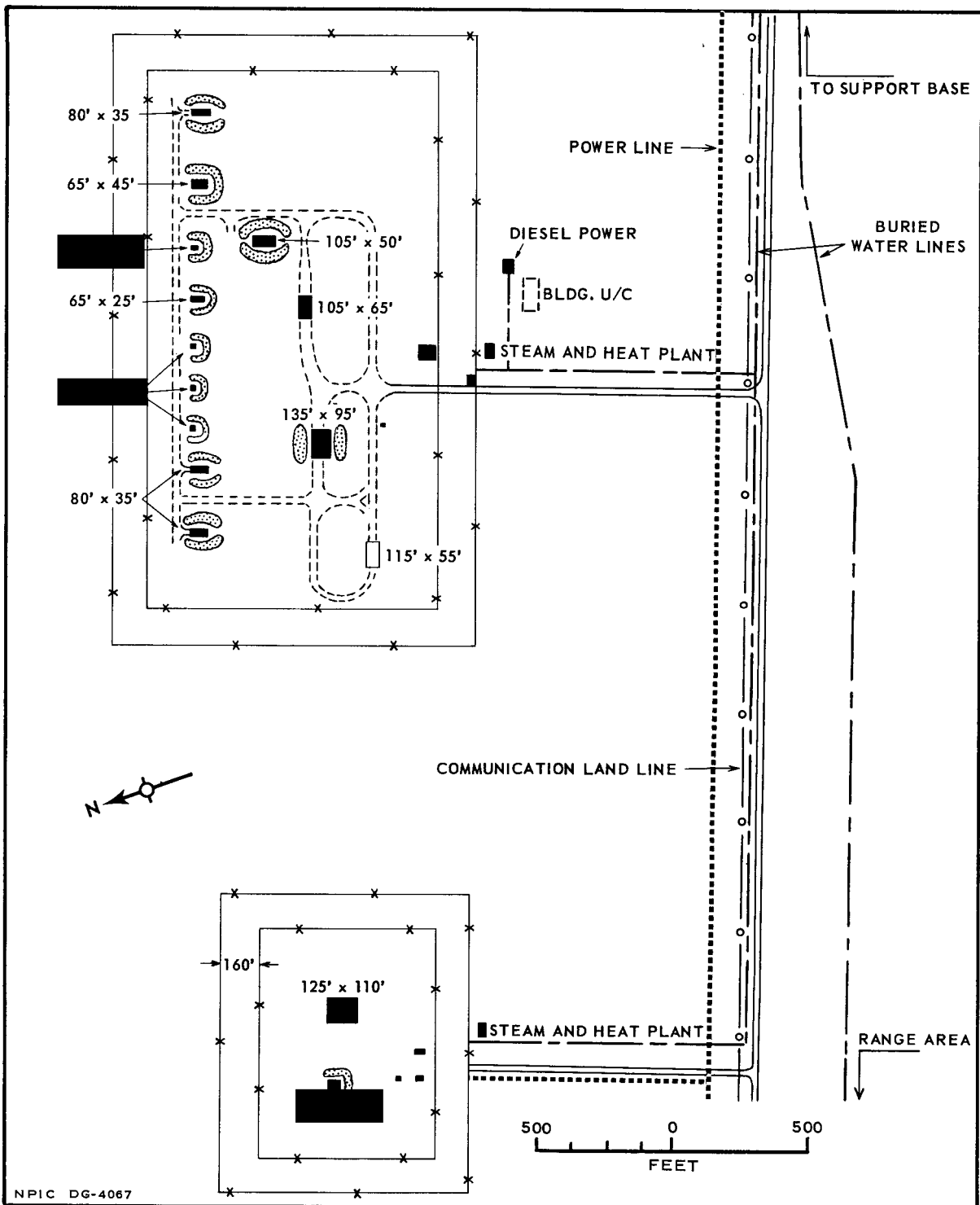


FIGURE 7. EXPLOSIVES-STORAGE AND HANDLING AREA. The two separately fenced facilities contain a total of 12 revetted buildings.

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Construction Support and Storage Area

This area is centrally located between the Main Housing Area and the Test, Fabrication, Support, and Warehouse Area at 46-01N 73-35E and is both rail and road served. The area contains three motor pools, two barracks sites, housing, administrative facilities, a sawmill, warehouses, a concrete-fabrication plant, a four-track classification yard, and an abandoned airfield (see Figure 8).

The housing and barracks appear adequate to accommodate all the personnel working in the area. The size and facilities of the three motor pools indicate that they can handle all phases of maintenance. Motor pool No 3 contains a large motor park, occupied at the time of photography by 28 construction vehicles. However, it is capable of holding at least 175 vehicles. The concrete-fabrication plant, which has a large area for curing and storage of products, appears to have been in operation for some time. A possible water line enters the area from the north, and a large water tower is located on the west side of the area. Extensive track activity originates in the area and extends to the surrounding facilities. Table 1 gives the number of buildings, roof cover, number of vehicles

Table 1. Buildings, Vehicles, Rail Cars, and Personnel, Construction Support and Storage Area					
Location	No of Bldgs	Roof Cover (1,000 sq ft)	No of Vehicles	No of Rail Cars	No of Personnel*
Motor pool No 1	23	20.5	163	-	-
Motor pool No 2	2	3.5	26	-	-
Barracks site No 1	23	81.0	4	-	540
Housing site	13	23.0	0	-	(31 family units)
Motor pool No 3	14	63.0	28	-	-
Classification yards	8	5.0	7	43	-
Barracks site No 2	18	79.5	4	-	530
Admin & Housing site	32	53.5	4	-	265 (plus 16 family Units)
Admin site	11	35.0	12	-	-
Warehouse site No 1	20	114.0	14	-	-
Sawmill	10	61.0	12	-	-
Concrete-fabrication plant	17	96.0	10	-	-
Warehouse site No 2**	6	30.0	5	1	-
Miscellaneous	17	34.0	32	3	-
Total	214	699.0	321	47	1,335 (plus 47 family units)

* An estimate based on 150 sq ft per man.

** Site partly cloud covered; building and vehicle count incomplete.

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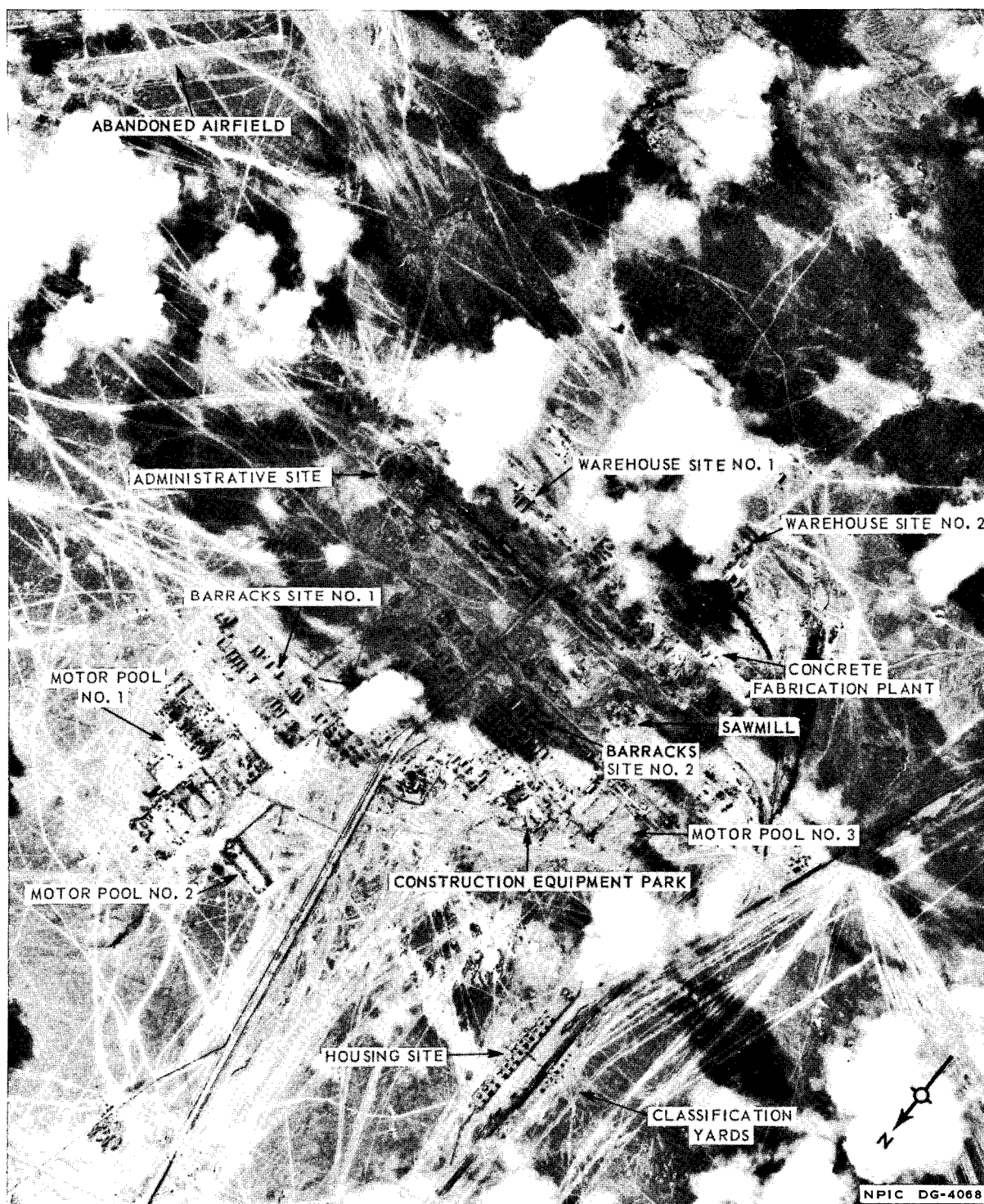


FIGURE 8. CONSTRUCTION SUPPORT AND STORAGE AREA. This area includes administration, housing, warehouse, barracks sites, and other support facilities.

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and rail cars, and estimated number of personnel housed in the area (see Figure 8).

Table 2 gives the vehicle types and number of each found in the three motor pools.

Table 2. Types and Number of Vehicles in Motor Pools, Construction Support and Storage Area			
Vehicle Type	Motor Pool No 1	Motor Pool No 2	Motor Pool No 3
Dump truck	65	6	3
Cargo truck	80	3	13
Van truck	-	2	-
Flat-bed trailer	-	-	2
Truck-mounted crane	-	-	1
Grader	-	-	3
Unidentified	18	15	6
Total	163	26	28

Airfield

Sary Shagan Airfield is located at 46-02N 73-30E. The main runway, 9,850 by 185 feet, is oriented northeast-southwest and has an alternating black-and-white stripe down the center (see Figure 9). Another runway appears to extend at a right angle from the main runway. Landing aids, which include GCA equipment, runway lights, ILS beacons, and communications, give the airfield an all-weather capability. Two taxiways and one parking ramp are complete; another taxiway and two other parking ramps are under construction. At the time of photography the following aircraft were at the field: 9 BADGER, 14 BEAGLE, 3 FLASHLIGHT, 14 FAGOT/FRESCO, one CAMP, 4 CRATE, 5 CAB, 9 COLT, 5 HOUND, and 9 unidentified liaison-type.

Adjacent to the north side of the field is a housing and support area. Support facilities include maintenance shops, one completed hangar (210 by 130 feet), and another hangar (260 by 200 feet) under construction. The housing consists of 35 barracks-type buildings capable of housing 1,200 persons. A POL storage area, also adjacent to the north side of the field,

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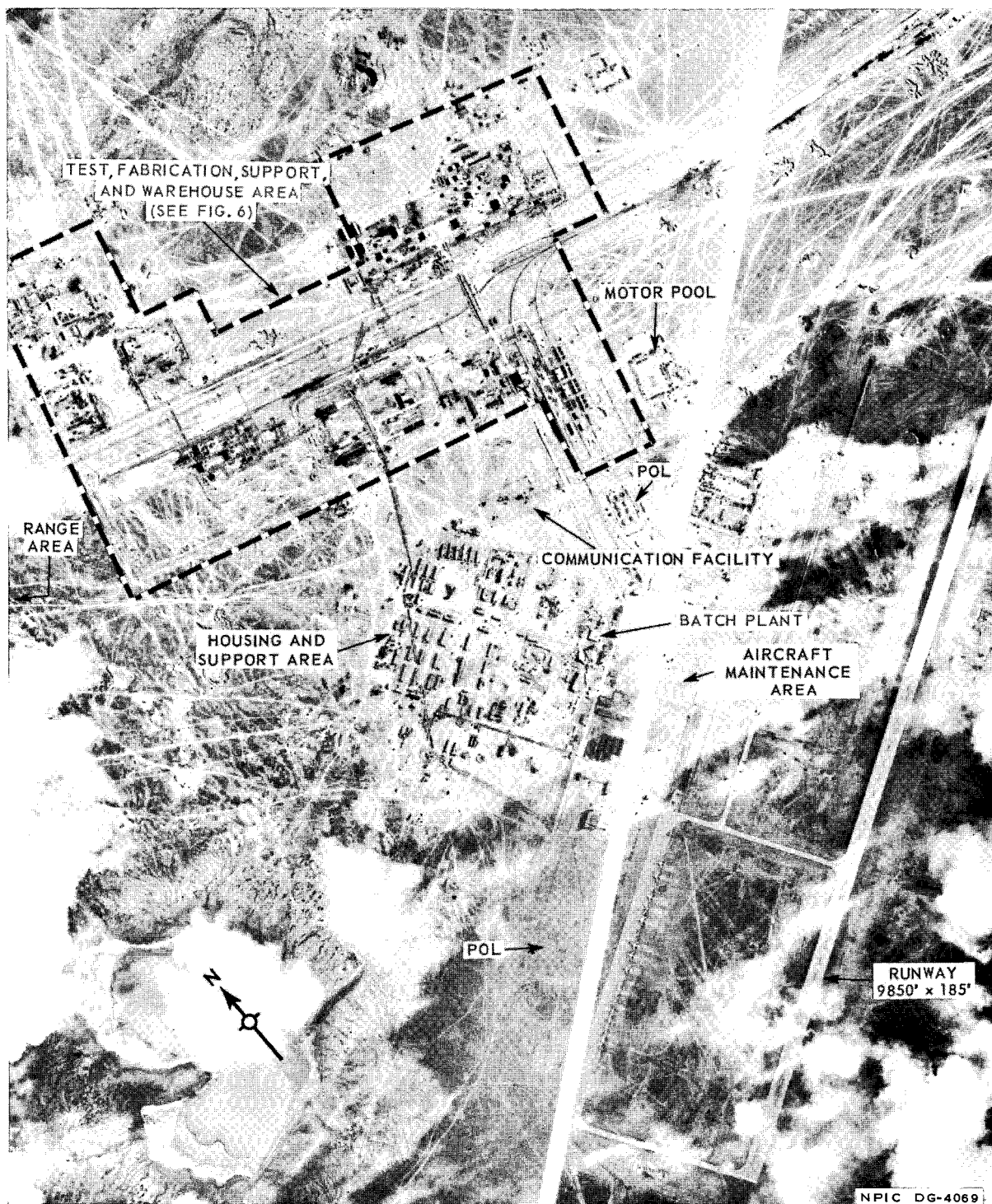


FIGURE 9. AIRFIELD AND NEARBY FACILITIES. A total of 73 aircraft were at the field at the time of photography.

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contains six completed buried tanks, two tanks under construction, and a number of tank trucks. Also present is a fenced airfield communications facility containing four masts, a control building, and various small buildings. There are numerous other support buildings. A large batch plant is located on the road which separates the airfield from the housing and support area.

Dirt Strip

Located at 45-56N 73-27E, approximately 4.5 nautical miles (nm) south of the airfield is a dirt strip connected to the field by a dirt road 20 feet wide (see Figure 10). The strip measures 16,300 by 250 feet. A 50-foot ungraded road generally parallels the strip at a distance of 500 to 650 feet. If this is a recovery strip, this 50-foot road may be used as a guide for control aircraft or even as an emergency strip in the event of a flameout. While no GCA equipment is apparent, there are two unidentified man-made objects 1,500 feet apart which may be emergency ground-control equipment. There is no evidence to determine whether the strip has been used. In view of the construction stage of many of the other facilities in the Sary Shagan complex, this strip may be in an early stage and, with the addition of power, water, and other facilities, could be used as a sled track for biological experiments in astronautics.

Abandoned Airfield

At the abandoned airfield (see Figure 8), which is in the Construction Support and Storage Area, many roads and ground scars crisscross the old runway and taxiways. At least four buildings and one probable motor pool containing at least 35 probable vehicles are visible in the area. Scattered heavy clouds preclude further interpretation.

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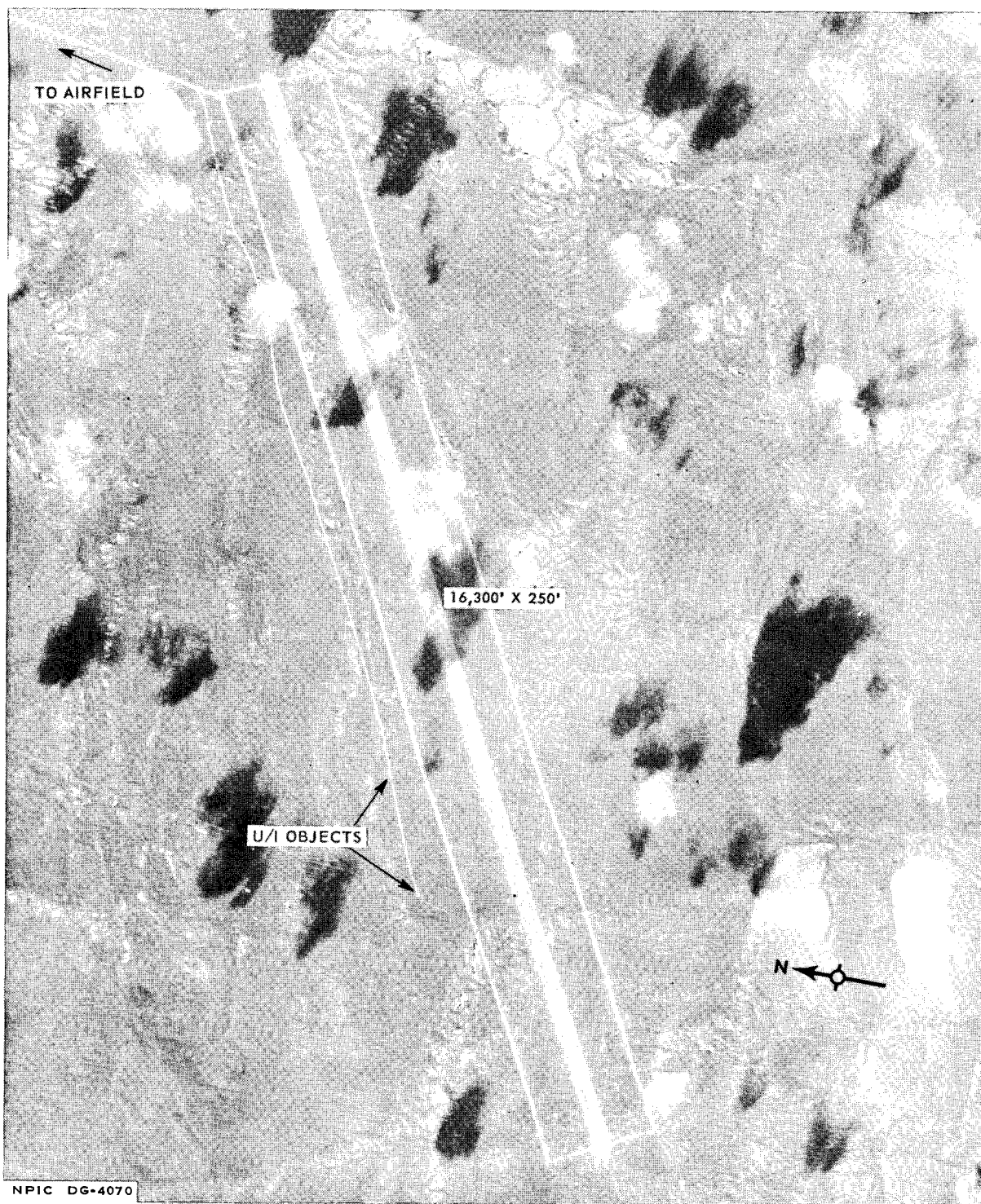


FIGURE 10. DIRT STRIP. This strip, 4.5 nm south of the airfield, could be a recovery strip.

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Power

Power is brought into the Sary Shagan complex from Balkhash on one three-phase circuit of 110 kilovolts (see Figure 3). Provision is made for a second 110-kilovolt circuit on the same towers, but this is not yet installed. The towers for the two circuits are Leningrad-type towers with an average span of 700 feet.

The main substation is located just west of the Main Housing Area. It measures 360 by 310 feet and has a 110-kilovolt switching yard containing two 110/35/6- or 10-kilovolt three-phase transformers with a probable capacity of 60 megavolt-amperes each, totaling 120 or 107.4 megawatts. There is also a control and low-voltage switching building, [REDACTED] with a 35-kilovolt switching yard.

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From the main substation, one 110-kilovolt power line extends to a substation in the Possible Operational Support Area of Launch Complex A. At the time of photography it had been recently installed and had one of two 3-phase 110-kilovolt circuits probably in service. No conductors had been strung for the second circuit.

An additional single-circuit 110-kilovolt power line is under construction to the substation near the Fabrication Facility. Towers for this line are wooden Pi-portal-type towers and steel Ryumka-type angle anchor towers with an average span of 400 feet. Photography indicates that no conductors have been strung.

A 35-kilovolt line extends from the main substation along the coastline to the low-voltage substation just north of Instrumentation Site 2. This line is supported on Pi-portal towers with an average span of 420 feet. A 6- or 10-kilovolt circuit on wooden or reinforced-concrete poles parallels the 35-kilovolt line. No definite connection of the 35-kilovolt line with the electronics sites along the lake coast is apparent.

The housing and support facilities are served by low-voltage 6- or 10-kilovolt distribution circuits, stepped-down to 220/110-volt utilization circuits of 50 cycles for consumers.

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TransportationRail

Within the Support Base is a total of 188 rail cars. The predominant type is the hopper car, both two- and four-axle, totaling 90 cars. Table 3 gives the number of cars, by type, and the number of locomotives in the base. The base is served by a rail line from Mointy to Chu.

In addition to the main line, the Support Base has approximately 6 nm of spurs, sidings, classification tracks, and repair tracks. Also within the base are approximately 16 warehouses of various sizes which are track served, a passenger station, and car repair and machine shops. The major rail facilities are in the Initial Support Area and the Construction Storage and Support Area. These are shown on Figures 11 and 12 and described in the accompanying keys to annotations.

Table 3. Rail Cars and Locomotives In Support Base		
Type	No of Axles	No of Cars
Box	2	19
Box	4	36
Hopper	2	13
Hopper	4	77
Gondola	2	7
Gondola	4	15
Flat	2	2
Flat	4	6
Tank	4	3
Passenger, 60'	-	4
Passenger, [REDACTED]	-	3
Passenger, 80'	-	3
Locomotive, steam	-	7
Locomotive, diesel	-	3
Total		198

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Road

No good roads lead either north or south out of the antimissile complex. Roads within the complex vary from hard-surfaced all-weather roads to tracks and trails. All the major installations are served by good roads. There are numerous motor pools and approximately 1,500 vehicles, excluding those that may be present at many of the sites and areas visible only on oblique photography. A realistic figure is difficult to obtain, for in many instances the areas themselves have not been identified and the number and types of vehicles cannot, therefore, be estimated.

Air

The completed airfield is capable of supporting sustained air trans-

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port. (Details of the airfield are given above.) Many of the various out-stations and range areas have airstrips which can accommodate light cargo and liaison planes. Although only a few helicopters are noted in the complex, the terrain is such that the movement of materiel by helicopter would be highly practical.

Key to Annotations on Figure 11 (Rail Facilities in Initial Support Area)	
Item	Description
1	3 holding tracks, 2,600' long, right side
2	3 classification tracks, 3,000', right side.
3	1 station tracks, 3,000' long, left side.
4	1 storage spur, 1,400' long, right side.
5	1 storage spur, 680' long, left side.
6	2 sidings, 1,100' long; 1 spur, 600' long, left side.
7	1 station/baggage spur, 1,100' long, left side.
8	Station building, 80' x 50', left side.
9	2 spurs, team tracks, 900' and 230' long, left side.
10	2 spurs, 250' long, left side.
11	Freight warehouse, 320' x 45', adjacent to open storage area, at end of house track, 1,800' long, right side.
12	Storage shed, 100' x 45', and lumber open storage area served by same spur as 11 above, left side.
13	2 stub tracks, 300' and 600' long, used for dumping of spoil, right side.
14	1 spur to fork of team and house tracks of construction area (annotations 15 and 16); 2,200' long, serves warehouse area, right side.
15	1 spur, 2,500' long, serves warehouses and pipe and steel beam open storage area, right side.
16	1 spur, 2,700' long to warehouses 480' x 70', 170' x 60', 145' x 60', 105' x 60', and 105' x 45'; extends to construction area warehouses 120' x 90', 105' x 45', 85' x 80', 55' x 55', 75' x 40', 75' x 40' and 145' x 55'; and to an open storage area with a gantry crane having a span of 115'.
17	Revetted fuel-storage area with 2 tanks, [REDACTED] diameter, 35' high, and having a capacity of 7,500 barrels; and 30' diameter, 35' high, capacity 4,500 barrels. Locomotive fuel loading rack and pumping station, 45' long, right side.
18	Car repair shop, 1 stall, 170' x 30', right side.
19	Machine shop, 90' x 40', right side.
20	Repair shop, 70' x 40', right side.
21	Locomotive repair shop, 3 stalls, 175' x 75', with attached shop, 260' x 30', right side
22	3 locomotive repair tracks, 1,100', 380', and 360' long, right side.
23	Turning wye, 400' controlling length, right side.
24	1 spur, 550' long, inside wye.
25	4 locomotive and car servicing/repair tracks, 700' long, right side.
26	1 spur, 1,100' long, to power plant, right side.
27	1 spur, 1,500' long, used as a house and team tracks, serves 2 warehouses, 200' x 55' and 190' x 30', right side.
28	Main line, south to Chu.
29	Main line, north to Mointy.

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Electronics

For purposes of this report, the electronics sites in the Sary Shagan Antimissile Complex have been classified into communications, instru-

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V.R

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May 1961

CENTRAL INTELLIGENCE AGENCY
PHOTOGRAPHIC INTELLIGENCE CENTER

ERRATUM FOR PIC/JR-1010/61

The red overprint on page 99 of PIC/JR-1010/61 is incorrect.
Pages 99 and 100 of this report should be replaced by the accompanying
sheet, which has the correct overprint.

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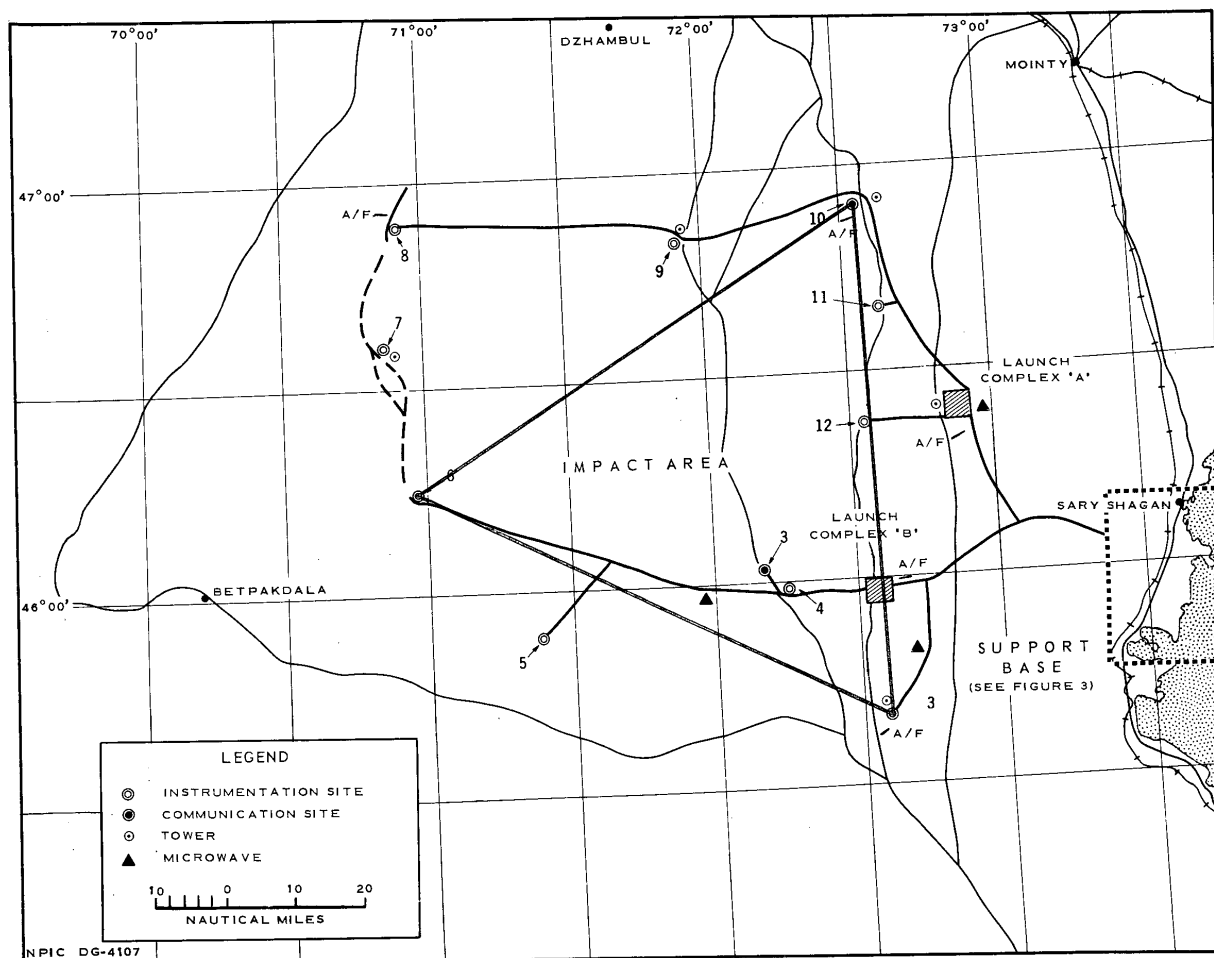


FIGURE 47. TRIANGULAR PATTERN FORMED BY INSTRUMENTATION SITES 3, 6, AND 10. These three sites may operate as one high-resolution tracking system.

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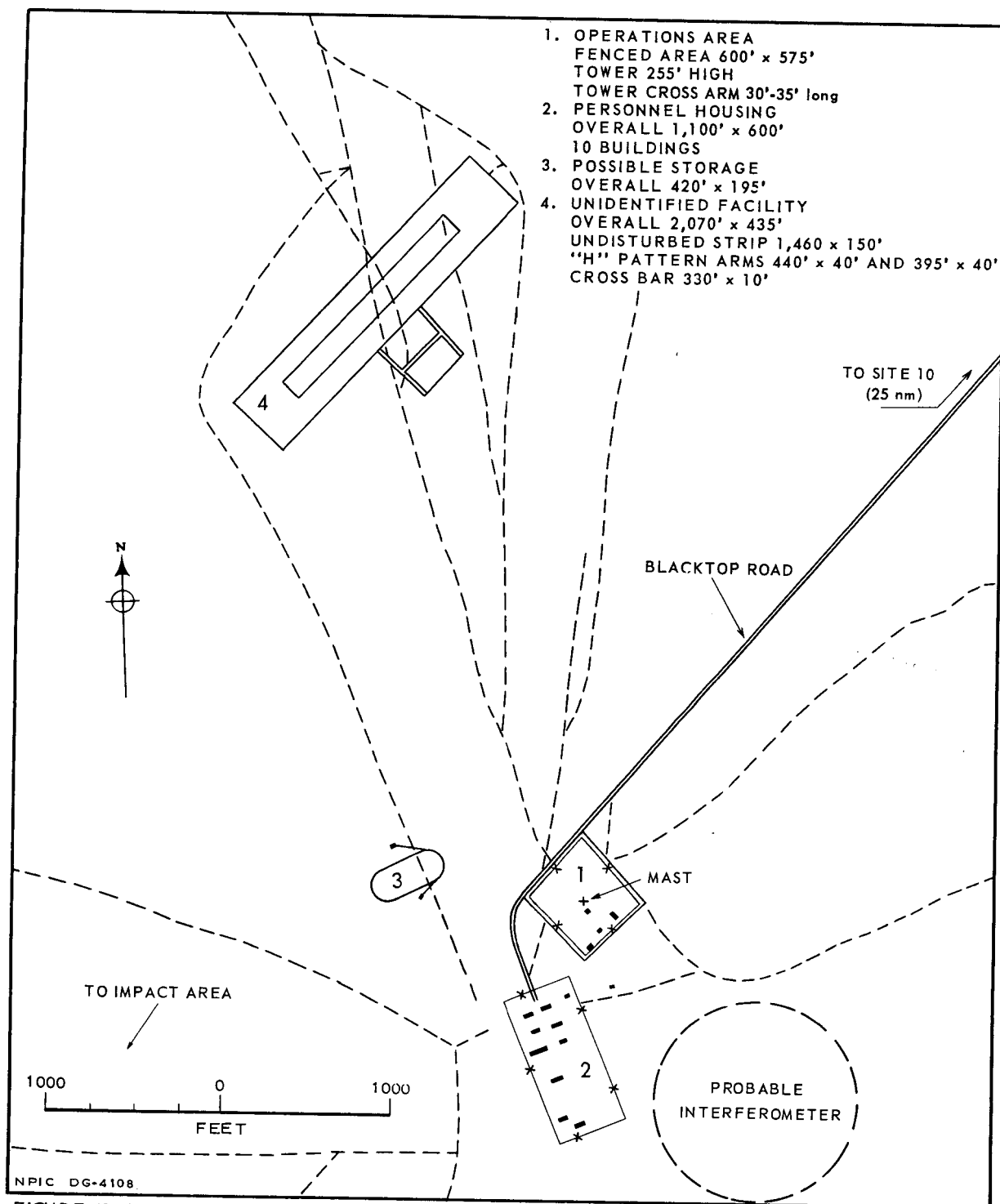


FIGURE 48. INSTRUMENTATION SITE 9. This site provides microwave communication, but its primary function is probably interferometer instrumentation.

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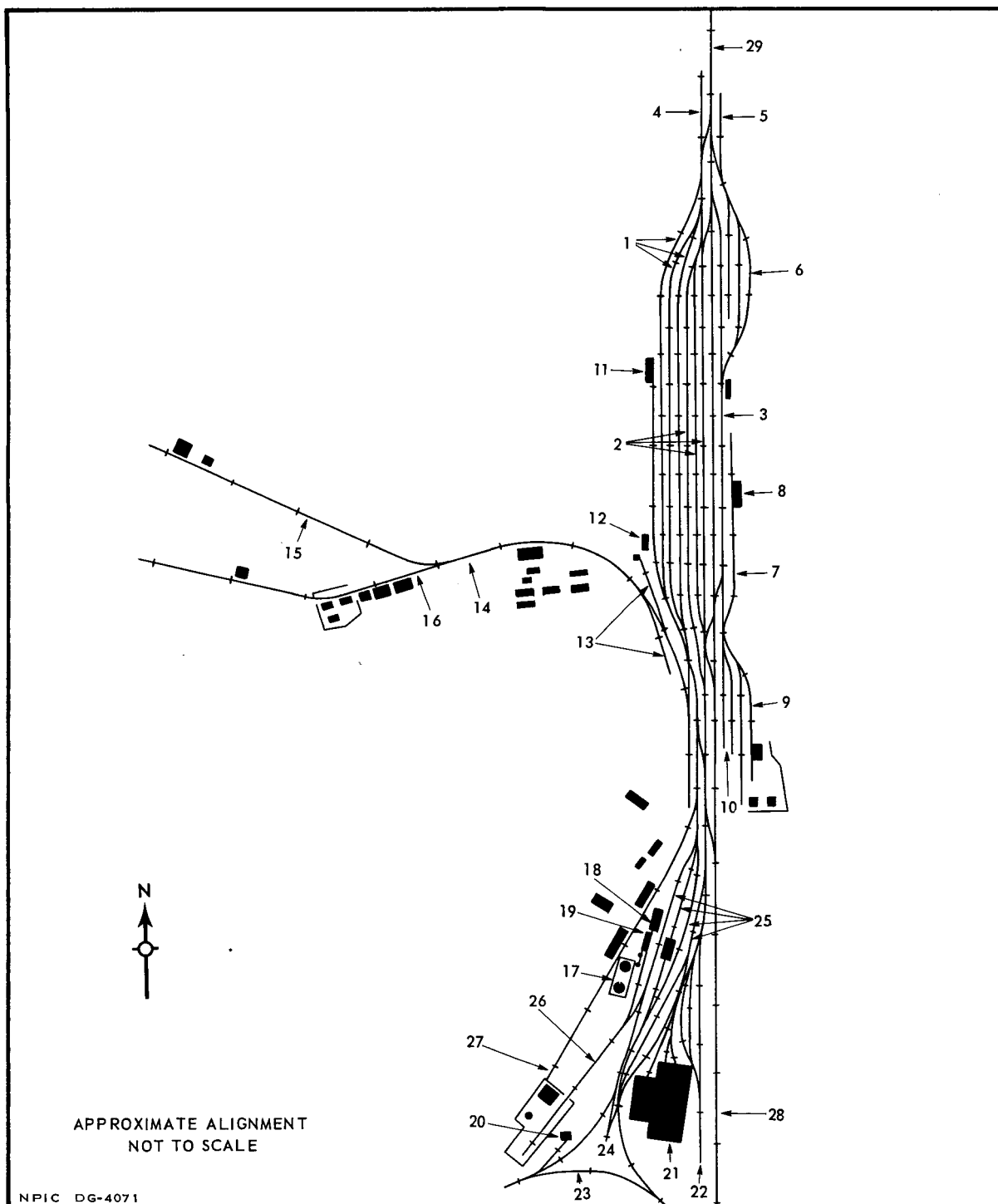


FIGURE 11. RAIL FACILITIES IN THE INITIAL SUPPORT AREA. The numbered items are described in the accompanying key to annotations.

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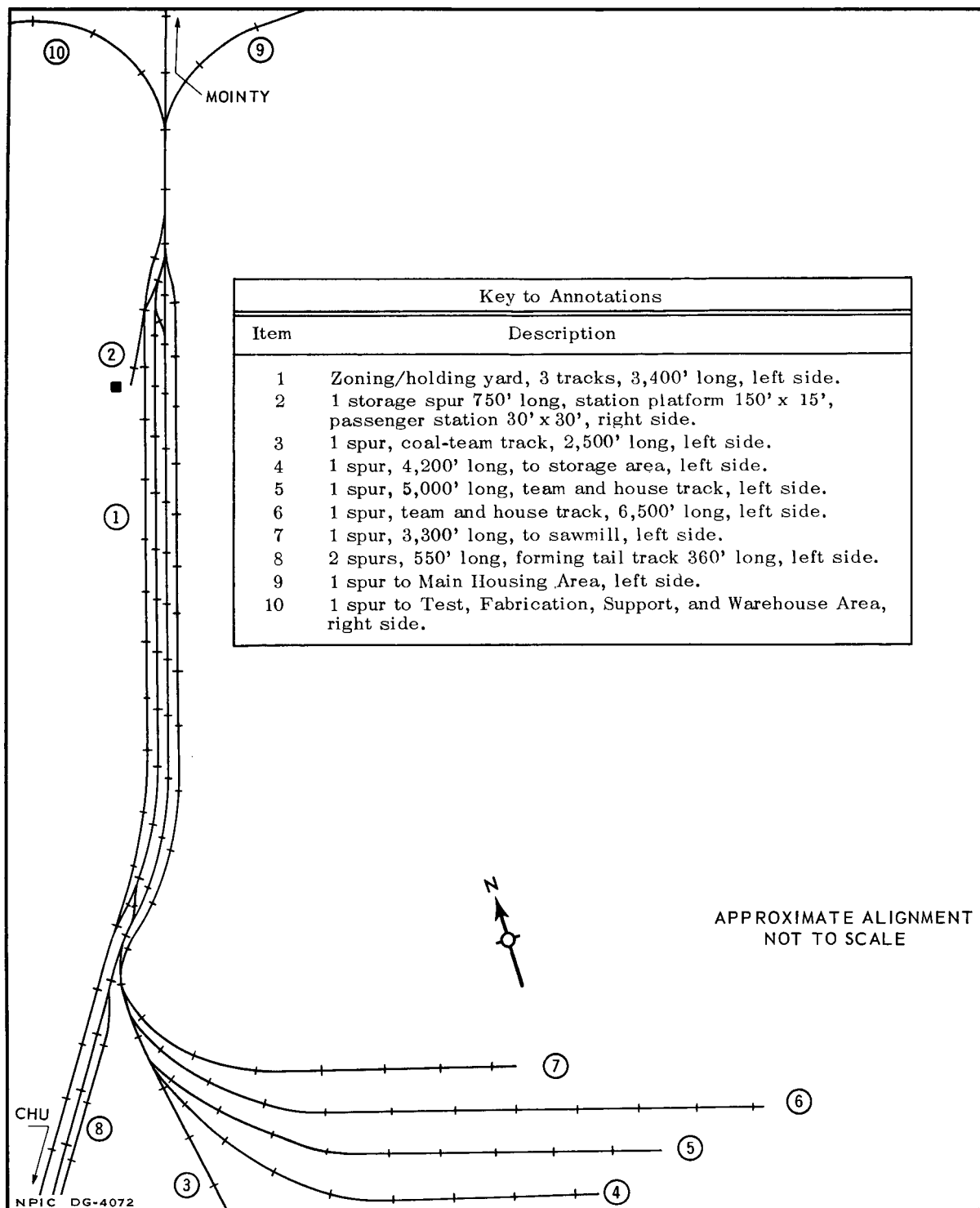


FIGURE 12. RAIL FACILITIES IN THE CONSTRUCTION SUPPORT AND STORAGE AREA. See the accompanying key to annotations.

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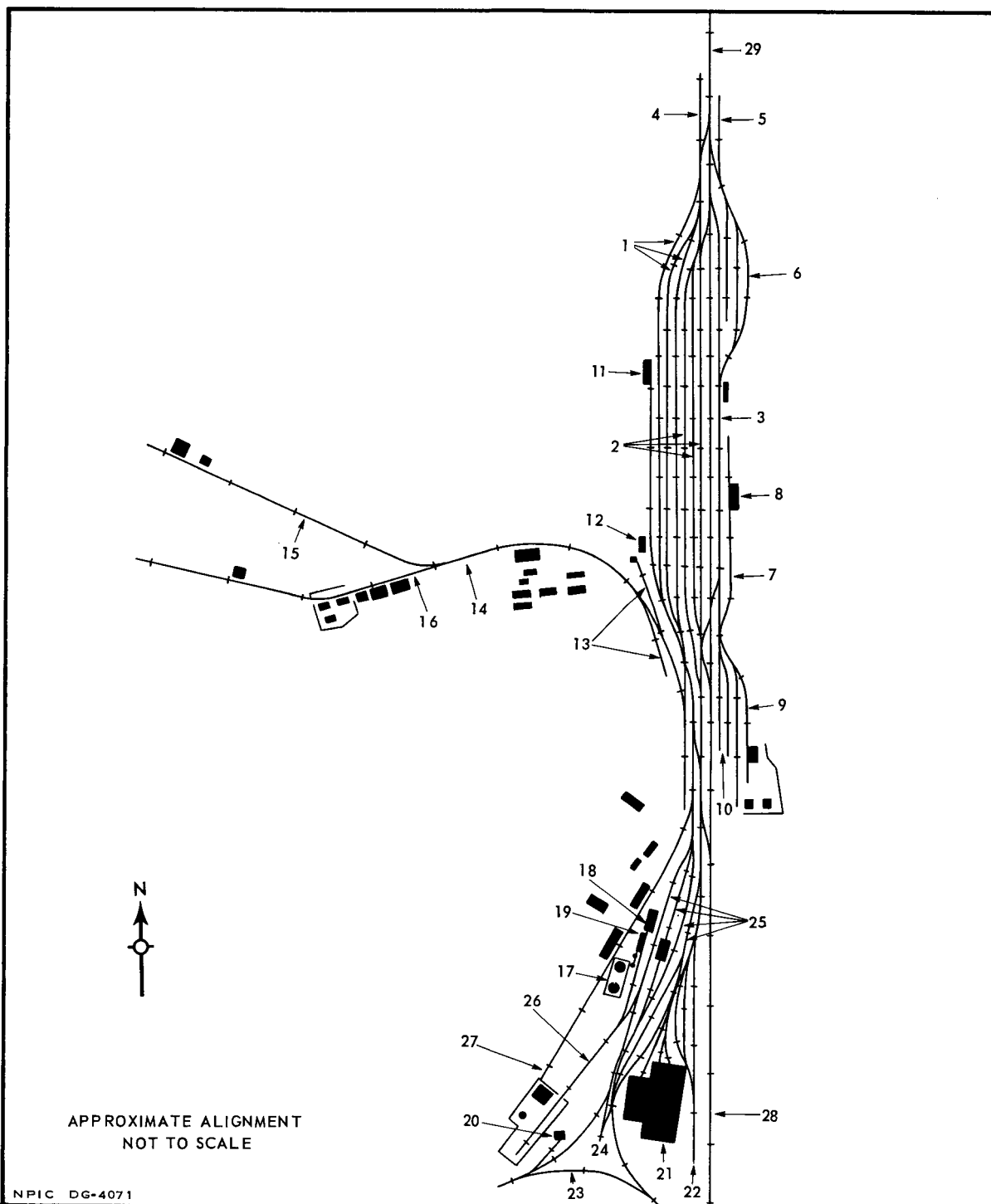


FIGURE 11. RAIL FACILITIES IN THE INITIAL SUPPORT AREA. The numbered items are described in the accompanying key to annotations.

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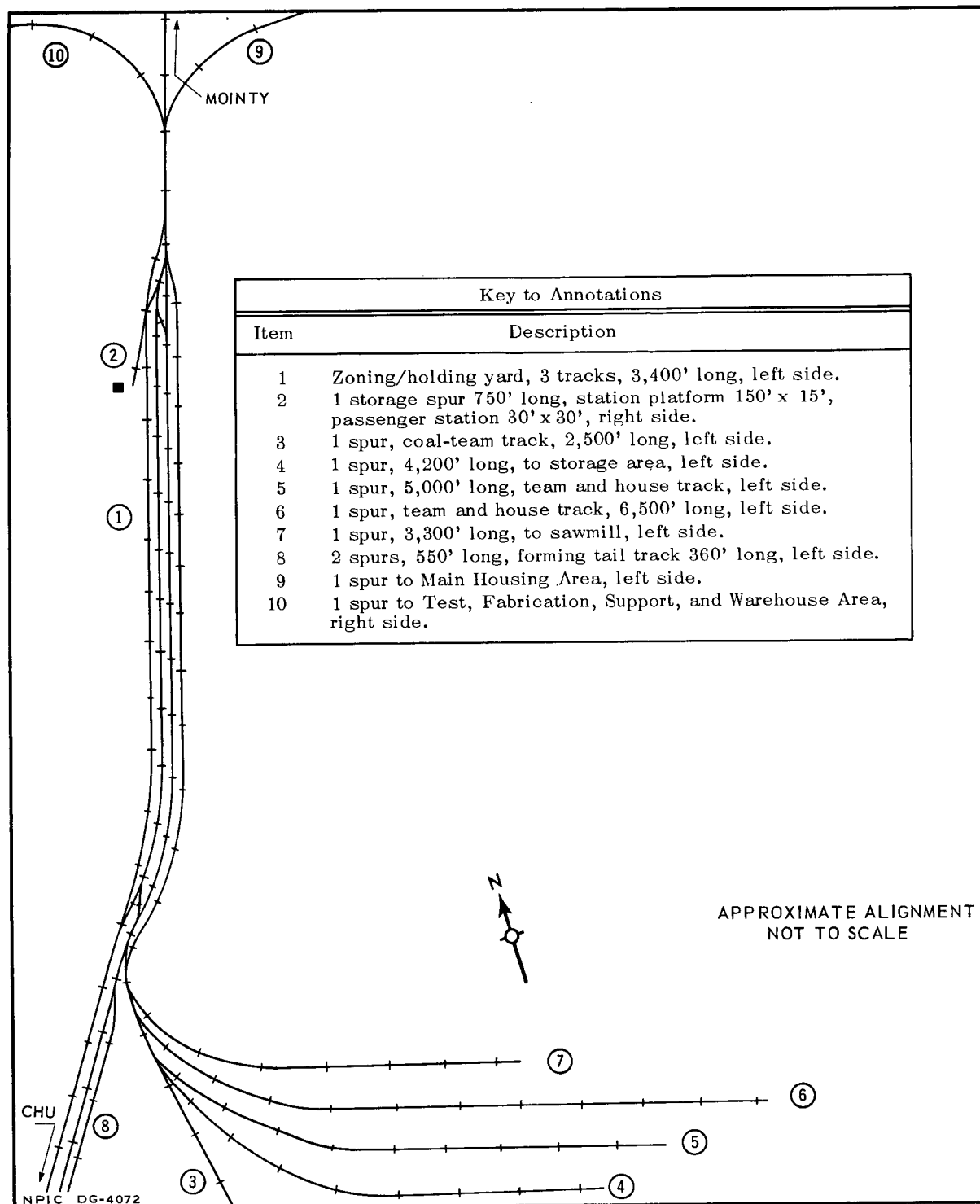


FIGURE 12. RAIL FACILITIES IN THE CONSTRUCTION SUPPORT AND STORAGE AREA. See the accompanying key to annotations.

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mentation, and radar sites. The complex contains a total of 17 electronics sites; of these, 3 are communications sites, 12 are major instrumentation sites (8 of these are interferometer-type sites), and 2 are radar sites. The Support Base has 2 communications sites, 2 instrumentation sites (one of which has an interferometer), and 2 radar sites. These are described below. Those electronics sites directly associated with facilities in the Impact Area are discussed in detail under that heading. (For convenience, Communications Site 3, although not in the Support Base, is included with the presentation of the base communications sites.)

Of the total of seven interferometers and one probable interferometer which were identified, one is on the coast of Lake Balkhash and the remainder are around the Impact Area. Two large linear antennas, probably radar antennas, one of which is under construction, and a long building which may house a third and larger antenna are located in the Support Base along the shore of Lake Balkhash. One outstanding feature of the Sary Shagan complex is that there are at least five tall self-supporting lattice towers to which no definite function can be ascribed. There appear to be microwave communications within the range area, but no tie-in of Sary Shagan with known microwave links in the USSR has been found.

The two communications sites in the Support Base have been arbitrarily designated Communications Sites 1 and 2. The third site, near Launch Complex B, has been labeled Communications Site 3. Scrutiny of the scars and construction activity in and around these sites gives some idea of the age and priority of communication. It is believed that, originally, communications for the complex were provided by the transmitting rhombics of Communications Site 1 and the receiving rhombics of Instrumentation Site 1 and that most of the traffic was with Moscow. Judging by scars and antenna orientation, a communications link was established with the Stalingrad-Kapustin Yar area at least a year before the time of the photography. When this link was established, Communications Site 1 was expanded and Communications Site 2 was constructed. At the completion of Site 2, it assumed the responsibilities of the base receiving site.

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Communications Site 1 (Transmitting)

This site is west of the Main Housing Area at 46-03N 73-36E. The site, which is roughly square, is fence-enclosed and occupies an area 2,600 by 2,400 feet. Facilities include 4 double rhombic antennas and 20 stick masts which probably support dipole antennas (see Figure 13). The rhombics are paired for day-night operation and are oriented toward Moscow and the Stalingrad-Kapustin Yar area (see Figure 14). The 20 masts are arranged generally in three lines; if all were utilized, a total of 16 dipoles would exist. The orientation of the probable dipoles indicates that they could provide a secondary means of communication with the facilities located around the Impact Area, in addition to the microwave net. Apparently, this site had been recently expanded or was being expanded at the time of photography. This conclusion is based on a comparison of the age of ground scars, the fact that the security fence was extended to accommodate rhombics 1 and 2, the presence of open ditching near the probable dipoles, and the fact that only 7 of the 16 probable dipoles appear to have possible feed anchors (which indicate the status of completion).

Communications Site 2 (Receiving)

This site is in the southern part of the Support Base at 45-54N 73-37E. It is connected to the major portion of the Support Base by an improved road and by a cable line. Facilities consist of 8 single rhombic antennas and 10 stick masts which may support 6 dipole antennas (see Figure 15). At the time of photography the security fence was under construction and there were open ditches and a great deal of fresh scarring throughout the site. It is probable that this site, although operational, is of recent construction. The eight rhombics are paired for day-night operation. In addition, the dimensions and orientations of the antennas indicate that antennas 1 and 2 may be paired with 11 and 12 and antennas 3 and 4 with 9 and 10 for space diversity reception (see Figures 15 and 16).

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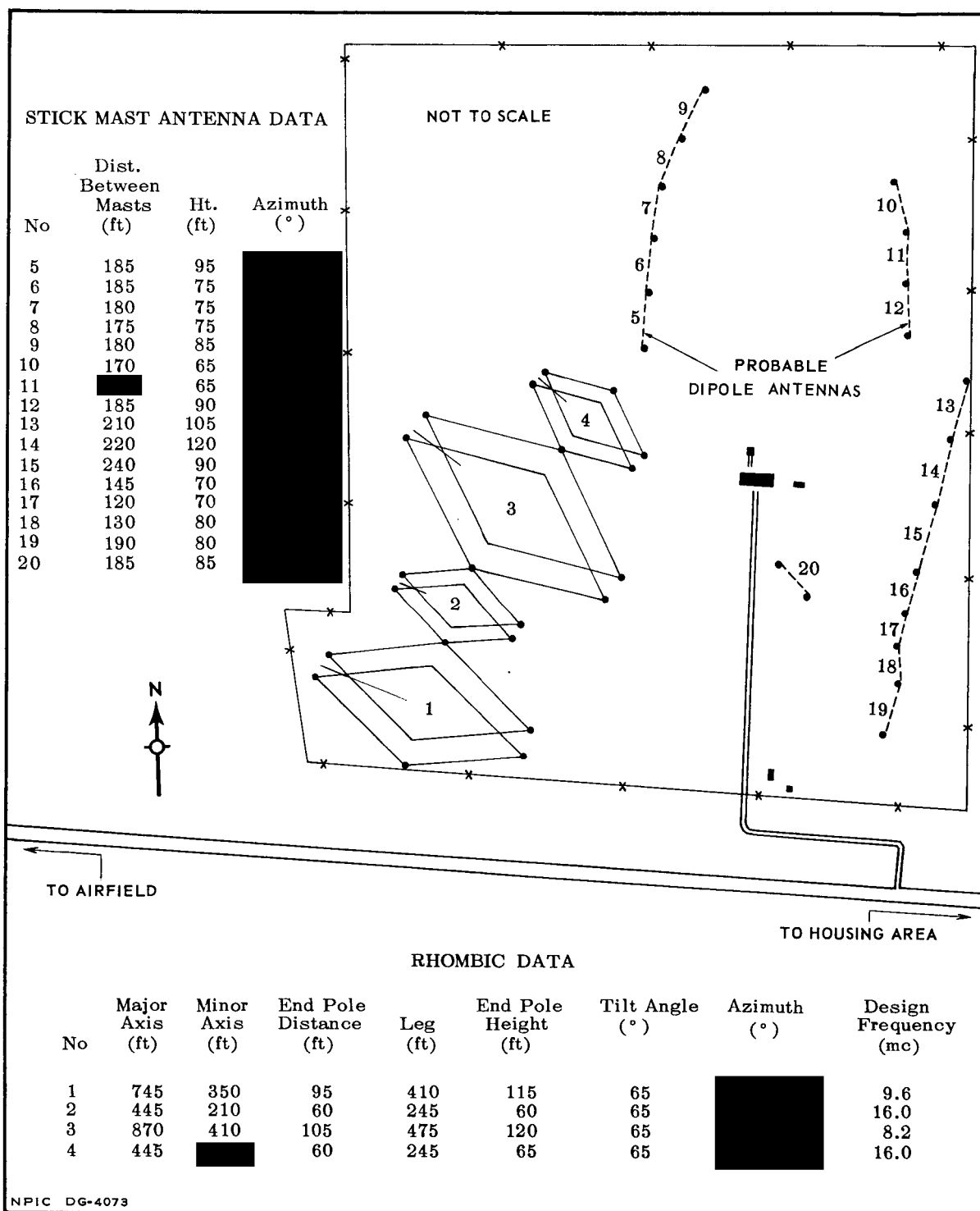


FIGURE 13. COMMUNICATIONS SITE 1 (TRANSMITTING). This site is west of the Main Housing Area.

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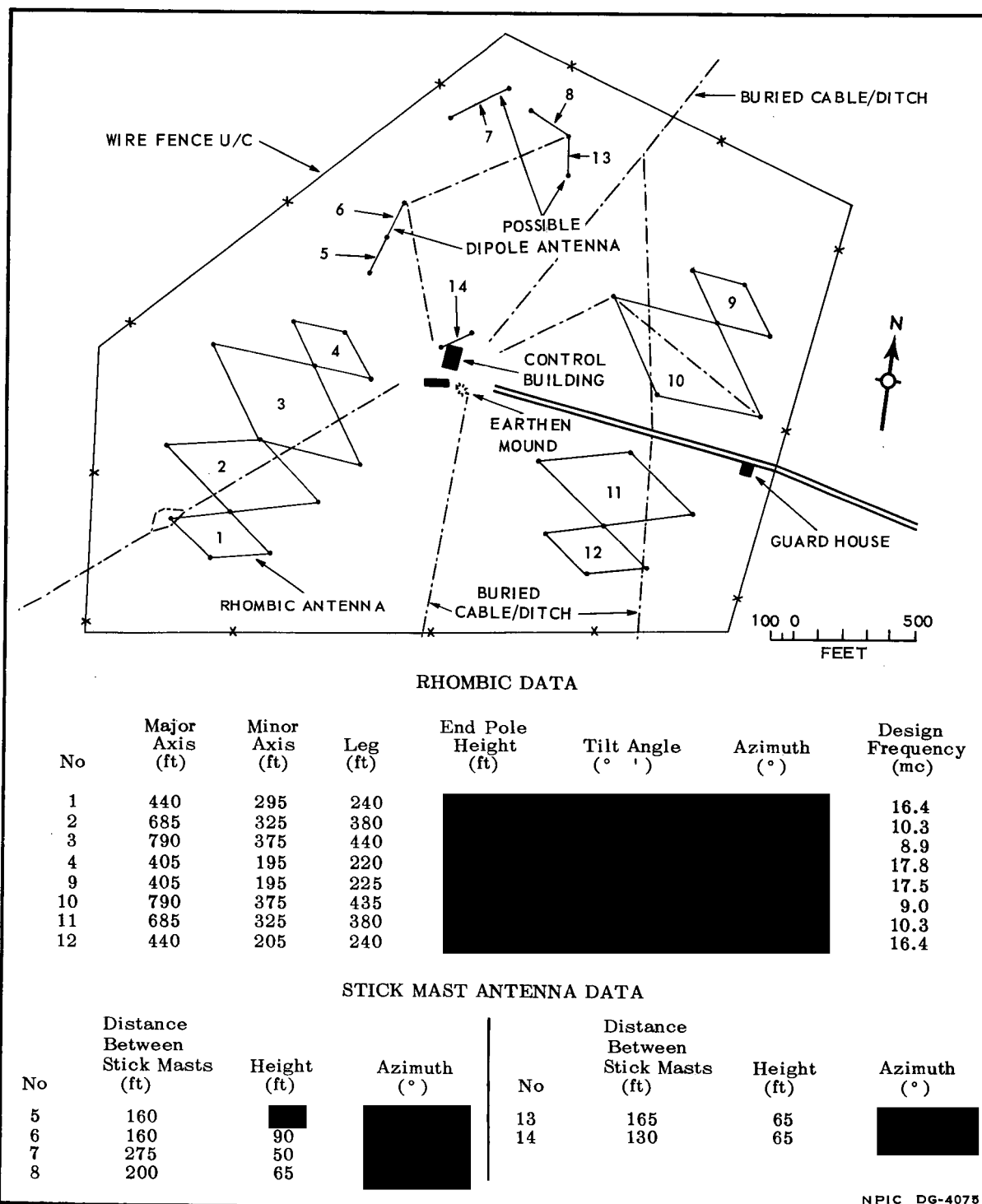


FIGURE 15. COMMUNICATIONS SITE 2 (RECEIVING). This site, although operational, is probably of recent construction.

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Communications Site 3

This site, located at 46-02N 72-09E, approximately 16 nm west of Launch Complex B, consists of four separate facilities connected by unimproved roads. The major facility is a high-frequency receiving facility utilizing two 5-3-3-5 fishbone antennas and containing at least 12 buildings, one of which is under construction (see Figure 17). Neither of the two antennas was completed at the time of coverage; masts lay on the ground awaiting the erecting crews.

In the vicinity are two other facilities, both containing groups of vehicles, similar to known mobile communications vans, which may house receiving equipment used while the fishbone antennas are under construction. The fourth facility is a fenced unidentified facility containing a single building under construction. Although no function can be ascribed to this facility at present, it may later contain microwave equipment for local communications or some type of VHF equipment that might be utilized in range-control planes or vehicles.

Instrumentation Site 1

This site is at 45-54N 73-38E, immediately south of Communications Site 2. It contains an interferometer, a probable instrumentation area with four receiving rhombic antennas, a control area, and a support area (see Figures 18 and 19). The site appears to be complete and operational and, with the exception of the interferometer, corresponds in age with Communications Site 1 (Transmitting).

The support area is midway between the interferometer and the probable instrumentation area and adjacent to the main north-south road from Sary Shagan. The area is fenced, contains at least 30 buildings of various types, a standpipe, and an athletic field. A water line leads from Lake Balkhash through the area and then toward the main part of the Support Base. There are no unusual features in the area.

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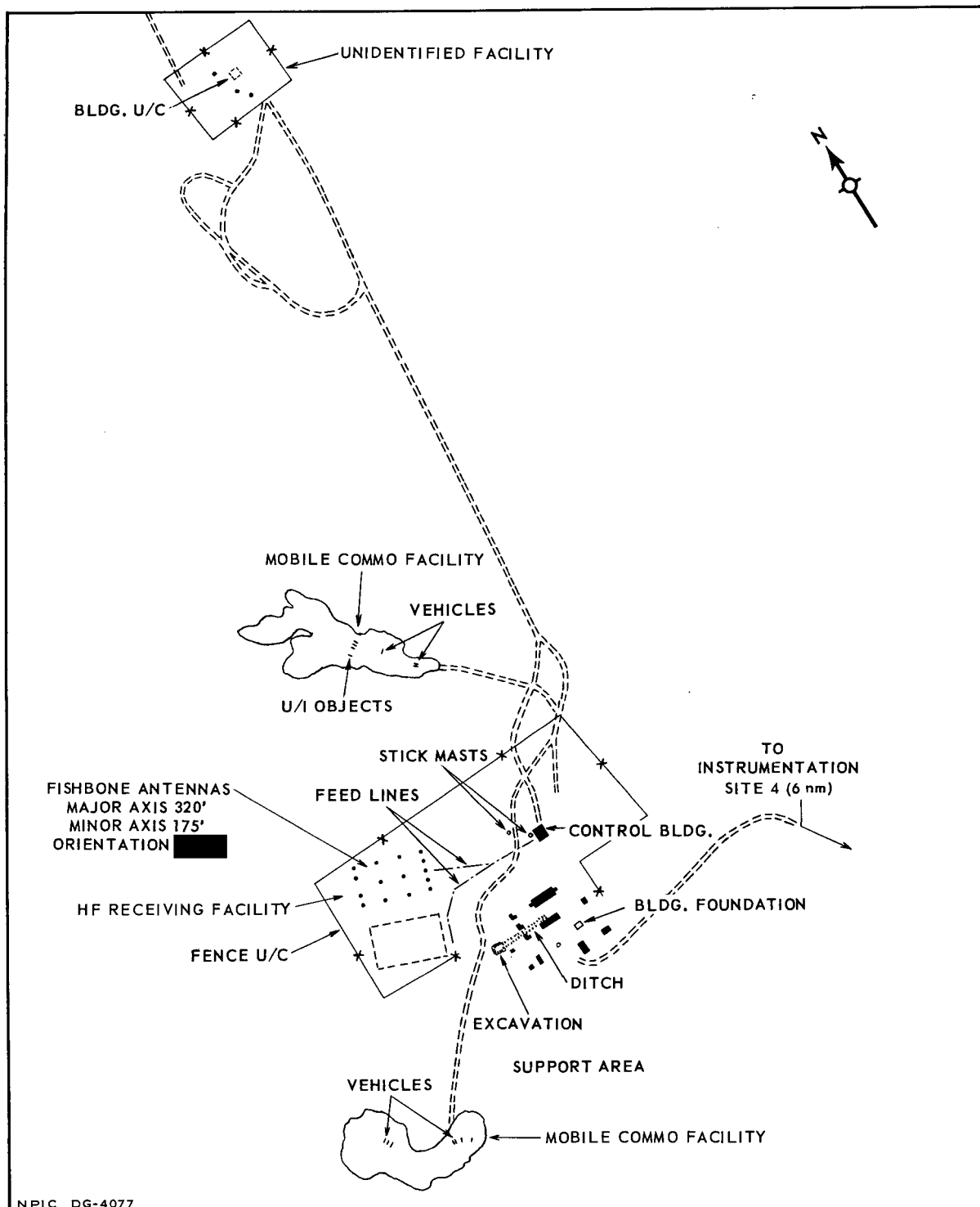


FIGURE 17. COMMUNICATIONS SITE 3. The major facility at this site, which is approximately 16 nm west of Launch Complex B, is a fishbone receiving facility under construction.

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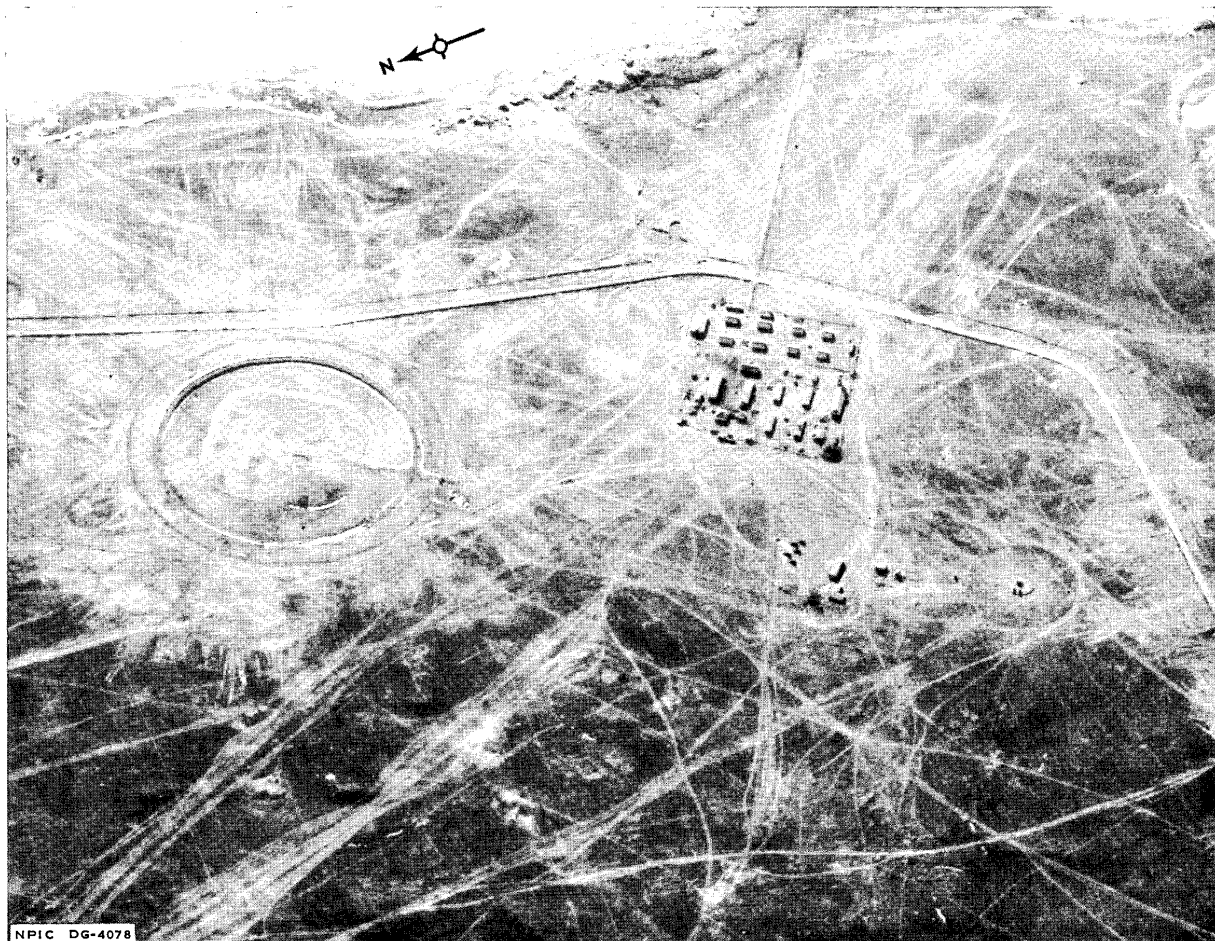


FIGURE 18. INSTRUMENTATION SITE 1. This site, immediately south of Communications Site 2, contains an interferometer.

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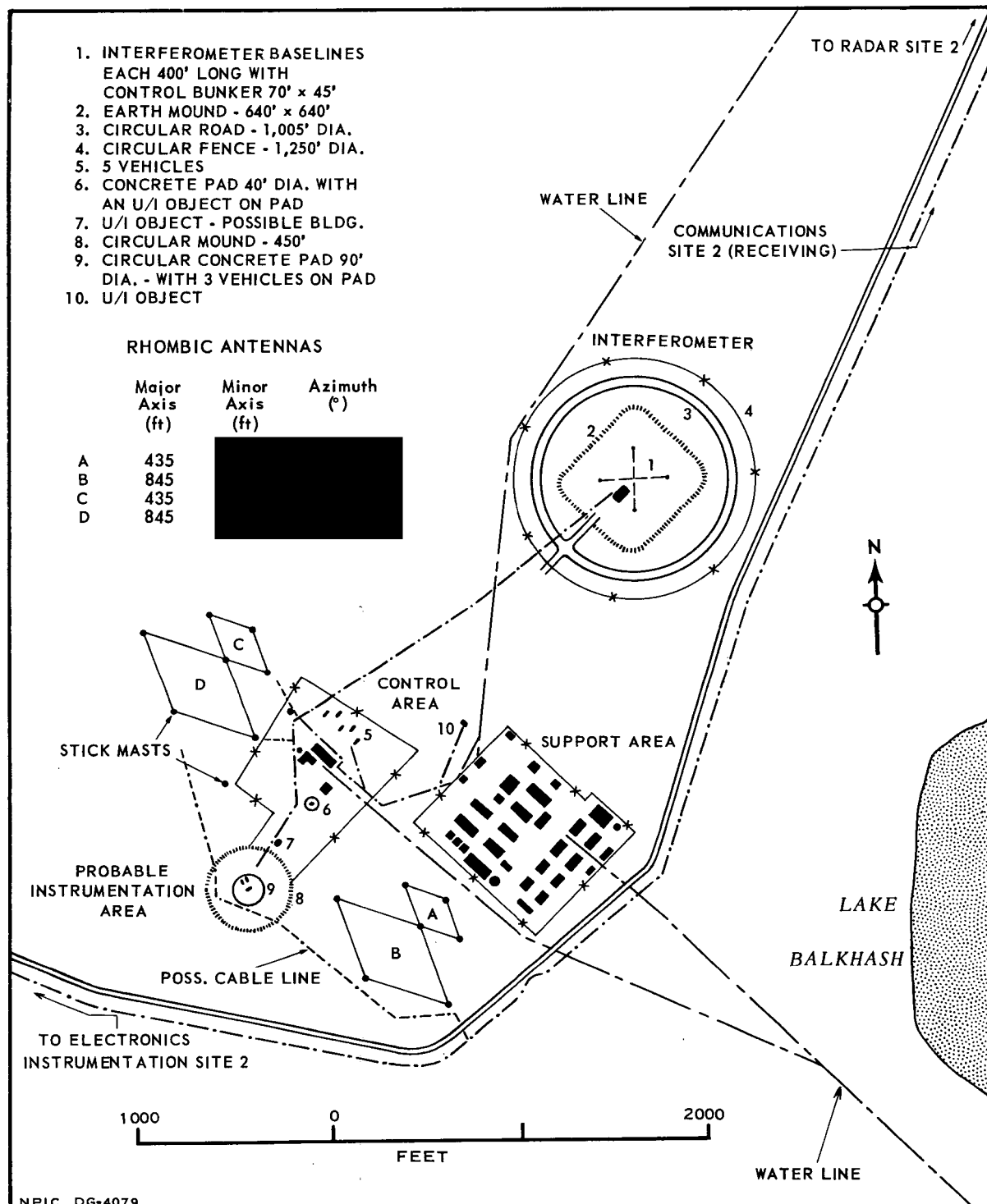


FIGURE 19. MAJOR COMPONENTS OF INSTRUMENTATION SITE 1. The site appears to be complete and operational.

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The probable instrumentation area is west of the support area and contains rhombic antennas and a circular concrete pad encircled by a low fence or mound. Three vehicles are positioned on the pad. Although no instrumentation equipment can be identified in the area, the probability that the area has an instrumentation function is suggested by the presence and arrangement of the vehicles on the pad and a cable scar which connects this area with the interferometer. The four rhombic antennas are arranged in two pairs, one pair on each side of the probable instrumentation area. Each pair consists of a day and night rhombic oriented toward Moscow.

The control area is north of the probable instrumentation area and contains three buildings, a small circular concrete pad with an unidentified object on it, and five vehicles in a staggered line. This area is probably the control point for the interferometer, the probable instrumentation area, and the rhombic antennas.

Instrumentation Site 2

This site, located at 45-48N 73-35E, contains a tall self-supporting lattice tower, a radar operations area, and a support area (see Figure 20). Construction under way at the time of photography involved minor expansion and the completion of permanent facilities and could be finished in a relatively short time. The site appears to be operational.

The outstanding feature of this site is the fenced self-supporting lattice tower, approximately 450 feet high. An object is just visible atop the tower, but the poor resolution of the photography precludes its identification. A possible cable leads from an unidentified object located along the northern portion of the tower fence toward the support area, but the cable scar becomes obliterated by heavy trackage near the support area. A ditch from the unidentified object leads to the radar operations area. From this area another ditch leads to the support area and apparently terminates at the water standpipe (see Figure 21).

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The radar operations area is fenced and contains a TOKEN-type radar with its accompanying vehicles, at least four buildings of varying sizes, a circular tank or cooling pond, and two semiburied structures. A ditch leads from the two structures to another semiburied structure 1,300 feet northeast of the area. This latter structure was apparently being fenced at the time of the photography; however, no function could be ascribed to it. A graded road runs from the radar operations area to the main road serving Instrumentation Site 1. A cable leads from this site to Communications Site 2.

The support area contains at least 22 buildings of varying sizes (one under construction), a standpipe, two earth-mounded tanks, a motor pool, and other facilities. About 1,200 feet west of the area is a small building which is connected to the two earth-mounded tanks by a ditch. One nm north of this site and adjacent to the road serving it is a power substation. An overhead power line leads from the main substation to this substation. The power line then leads underground into the radar operations area.

Radar Site 1

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At 45-59N 73-39E, just south of the Main Housing Area in the Support Base is the largest building observed in the entire complex. This building is [REDACTED] (see Figure 22). There are no apparent windows or chimneys. At right angles to one end of the building is another large building about 350 feet long, 50 feet high, and 60 feet wide which has windows (see Figure 23). Several other smaller buildings are located inside the fenced compound with at least one still under construction. It appears that a considerable water supply may be needed by the area, inasmuch as a small pumping station has been constructed on the shore of Lake Balkhash for this facility, although the end of the water line cannot be identified. At the time of photography, no major power appeared to be taken off the grid to the installation. The facility was probably still under construction, with its operational date several months away.

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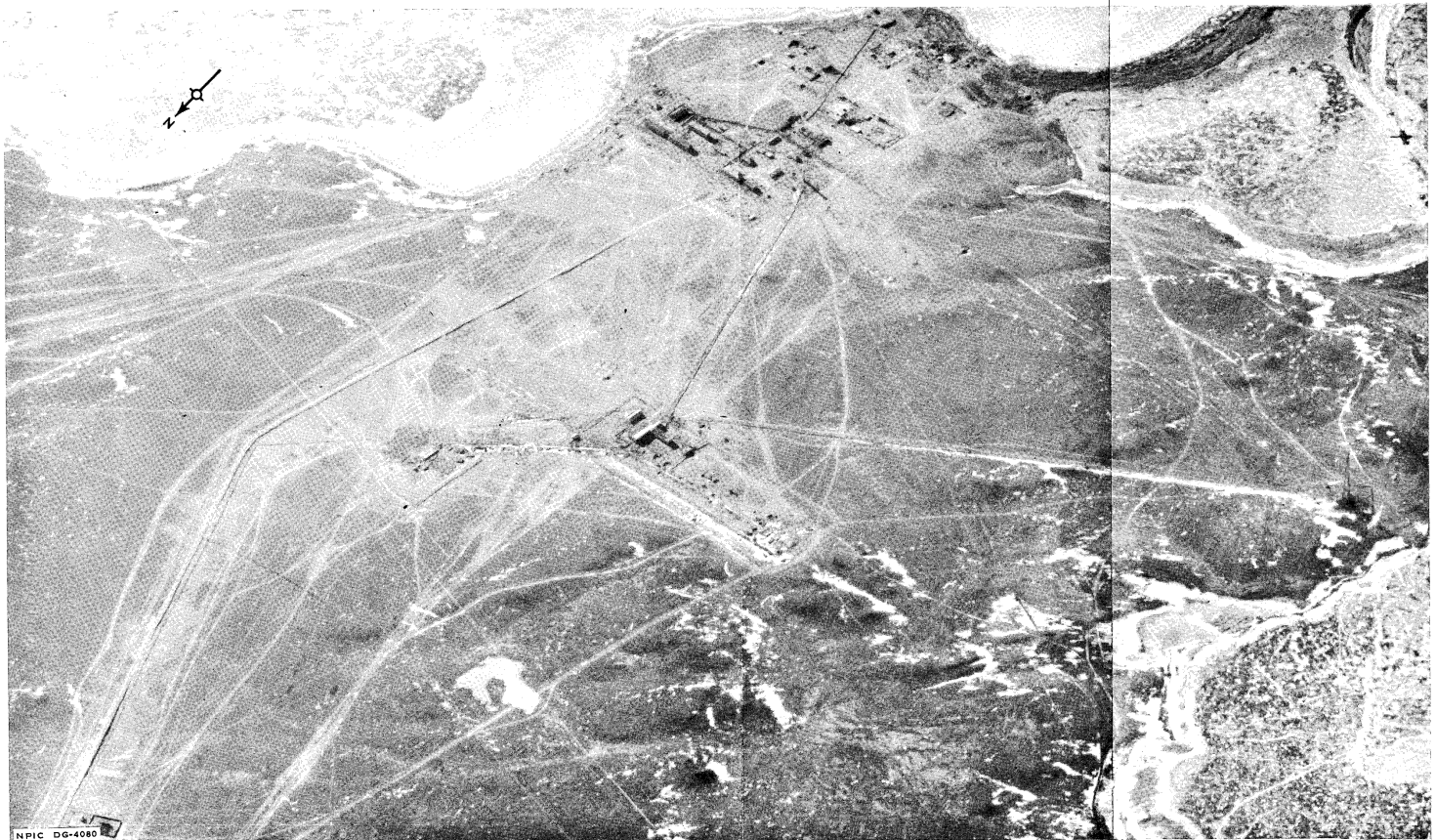


FIGURE 20. INSTRUMENTATION SITE 2. The outstanding feature is the tall self-supporting lattice tower.

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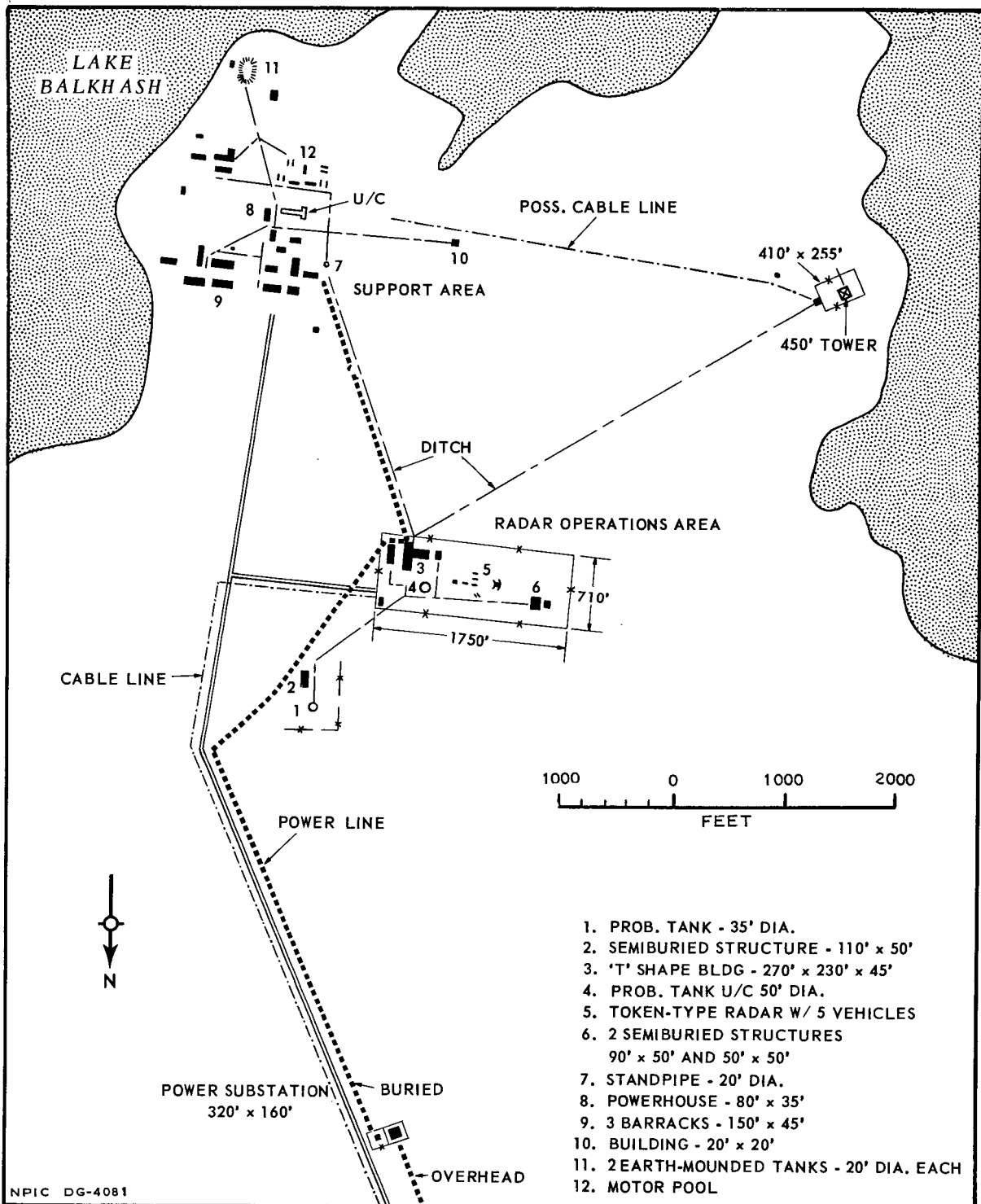


FIGURE 21. MAJOR FACILITIES AT INSTRUMENTATION SITE 2. The radar operations area contains a TO-KEN-type radar.

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FIGURE 22. RADAR SITE 1. This site, which is under construction, contains the largest building in the anti-missile complex.

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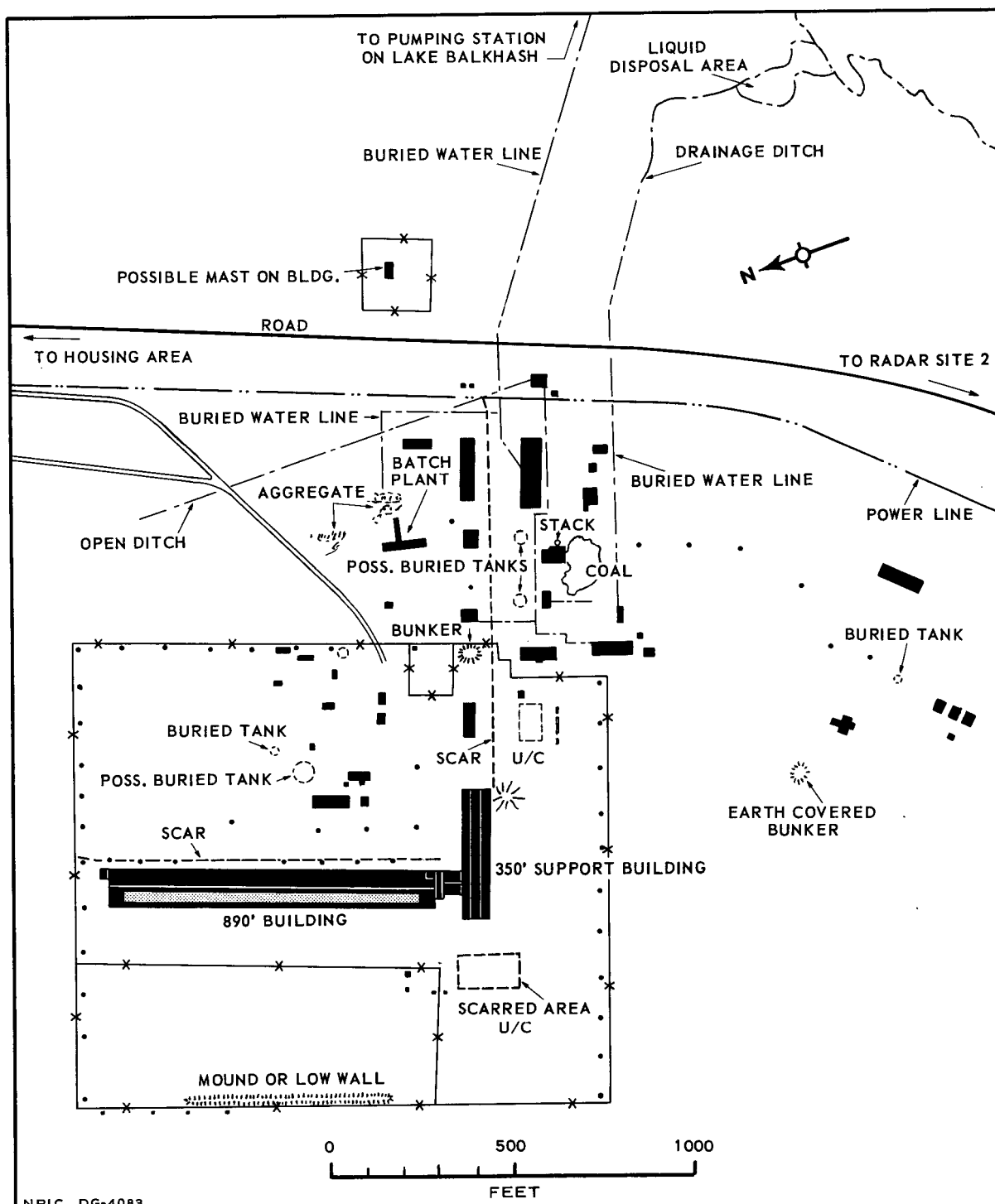


FIGURE 23. DETAILS OF THE FACILITIES AT RADAR SITE 1. The long building probably is, or houses, a linear antenna.

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25X1D The long building has been the source of some speculation, and numerous possible explanations have been examined. It is believed that the building is electronic in nature, and is probably a linear radar. The shape of the roof and the lines apparent across the "inset" in the westerly wall suggest that this building could house, or be, a very large antenna system. The orientation of the building is such that its direct angle of look is about [REDACTED] generally toward the Kapustin Yar range. The absence of any feed outside the structure and the enclosed volume behind the antenna lead to the conclusion that the feeds and switching gear are probably housed within the building, possibly for temperature-control purposes.

Some thought was given to the possibility of this antenna being an integral part of a system also containing two 500-foot antennas (see discussion of Radar Site 2 below), but the apparent total difference in engineering concept led to the belief that they are probably two independent systems, although the two linear antennas of Site 2 lend credibility to the hypothesis that Site 1 has an enclosed antenna nearly 810 feet in length (see Figure 24).

Although the linear radar concept is purely speculative, with no direct supporting evidence, it is considered the best of the possibilities concerning the role of this long building. Other possible functions can easily be envisaged, such as communication or solar energy conversion, but none of these appears to necessitate this very large type of building with the large adjacent building. In the radar explanation postulated above, the adjacent building would house the computers and machinery necessary for the proper functioning of the equipment. Figure 24 gives plan and elevation views of the building for analysis purposes and Figure 25 is a perspective of the building.

Radar Site 2

This site, located at 45-56N 73-38E, contains two large linear antennas, probably radars, each with adjoining support facilities. One an-

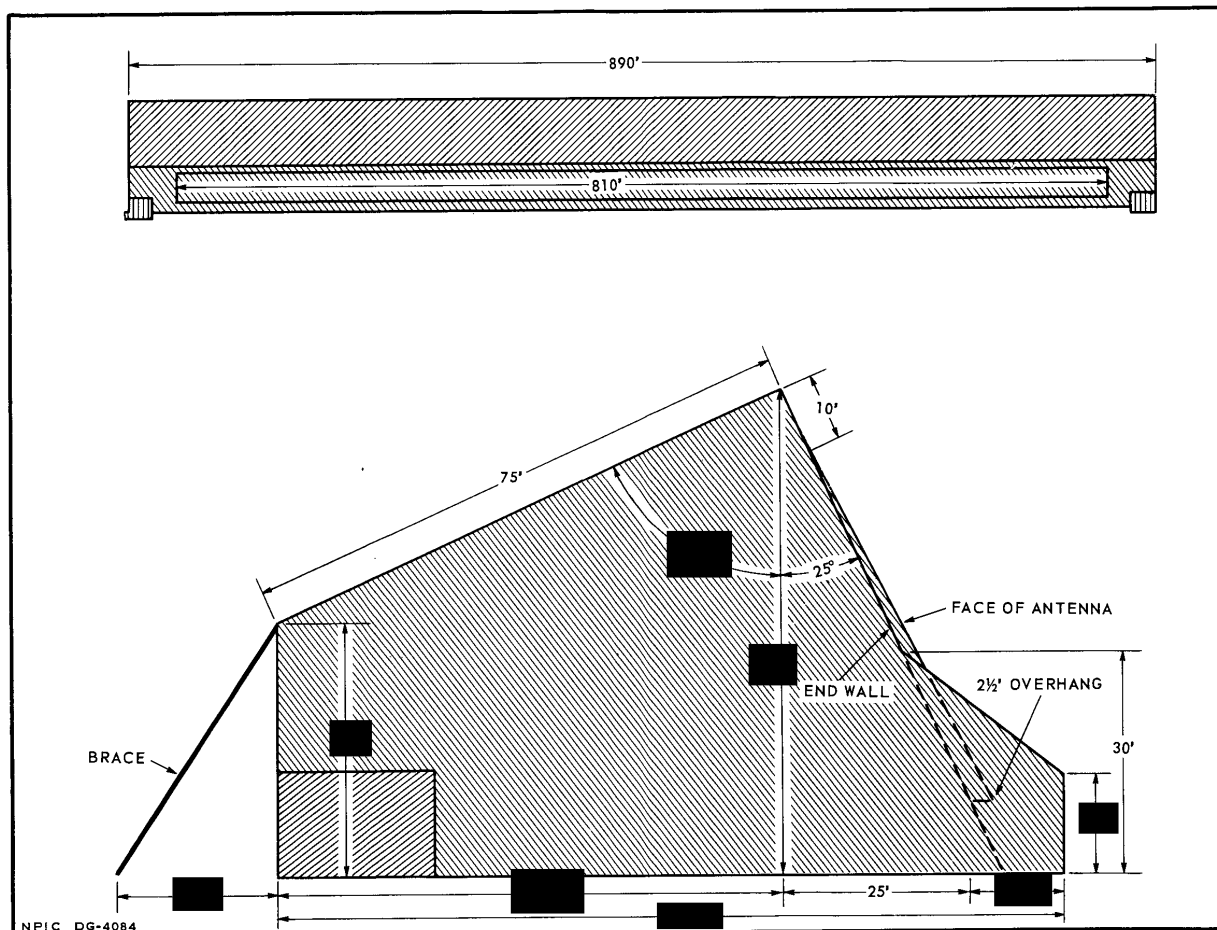


FIGURE 24. PLAN AND ELEVATION VIEWS OF LONG BUILDING AT RADAR SITE 1. This building could be or contain a very large antenna system.

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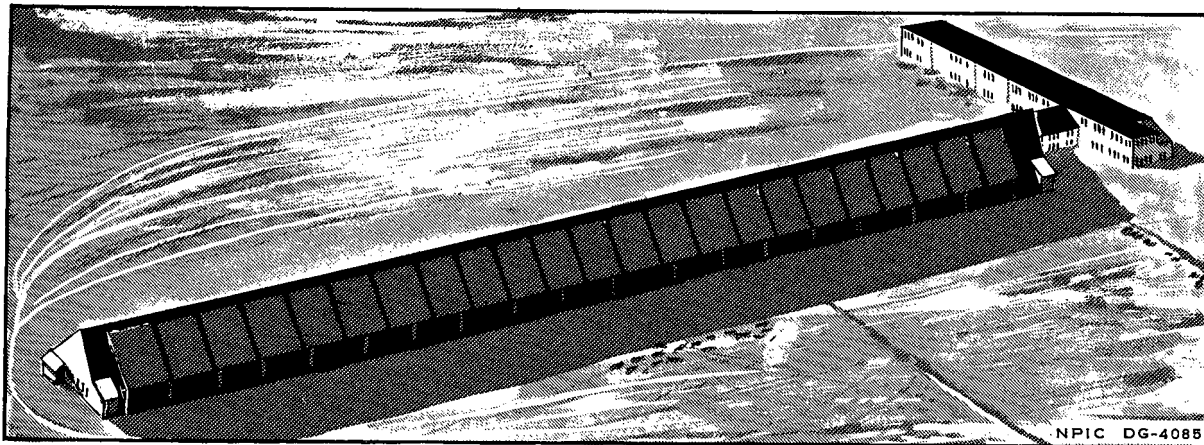


FIGURE 25. CONCEPT OF 890-FOOT BUILDING AT RADAR SITE 1. The angle of look is generally toward Kapustin Yar.

tenna is complete and the other, approximately 3,500 feet to the south, is under construction. Although the size of the second antenna cannot be determined because of cloud cover, the photographic evidence indicates that both antennas will be similar in design and size. The support facilities for the antenna under construction are also partially under clouds. The site is located along the road which runs roughly parallel to Lake Balkhash south from the major portion of the Support Base. At least three other electronics sites are located along this same road.

The completed antenna appears to consist of a nearly vertical, slightly curved parabolic reflector screen about 510 feet long, in front of which is a tubelike feed as long as the screen and 35 feet from the ground (see Figure 26). About 280 feet in front of the reflector screen and parallel to it is a ground clutter screen approximately 620 feet long and approximately [REDACTED] high. The top of the reflector screen is about 65 feet above the ground. Near the antenna is a large three-story control building 145 by 45 feet and several other support buildings. The two antennas are parallel, and a line constructed perpendicular to them is oriented on an azimuth of [REDACTED] generally south of the Tyura Tam rangehead.

Probable Microwave Terminal

A fence-secured site containing approximately seven major buildings

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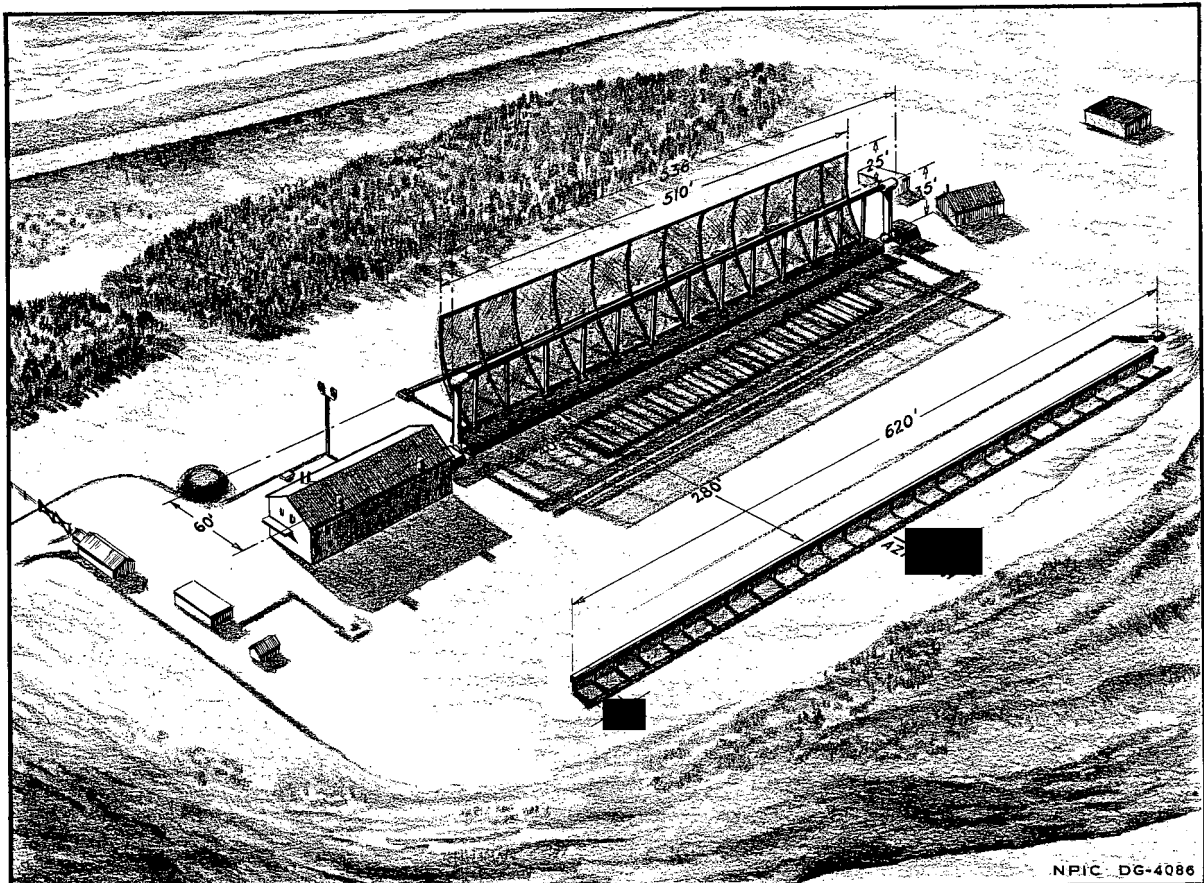


FIGURE 26. CONCEPT OF COMPLETED ANTENNA AT RADAR SITE 2. Another similar antenna is under construction 3,500 feet to the south.

is located on the west edge of the Support Base at 46-04N 73-26E. The number and type of equipment and facilities at this site have caused considerable speculation as to its function. These items include a 95-foot guyed box-lattice mast with at least 5 dishes mounted on it; 2 drive-on hardstands; 2 possible dipole antennas; 4 vehicles, 3 of which are communications-type vans parked in a pattern found at various instrumentation sites; and 4 earth-covered mounds (see Figure 27).

It has been suggested that this site is probably the microwave terminal for the Sary Shagan complex. Although the presence of the mast lends strength to this possibility, the amount and types of facilities found here suggest that, if this site is a microwave terminal, it may also have additional functions or missions. From what can be determined of the dishes

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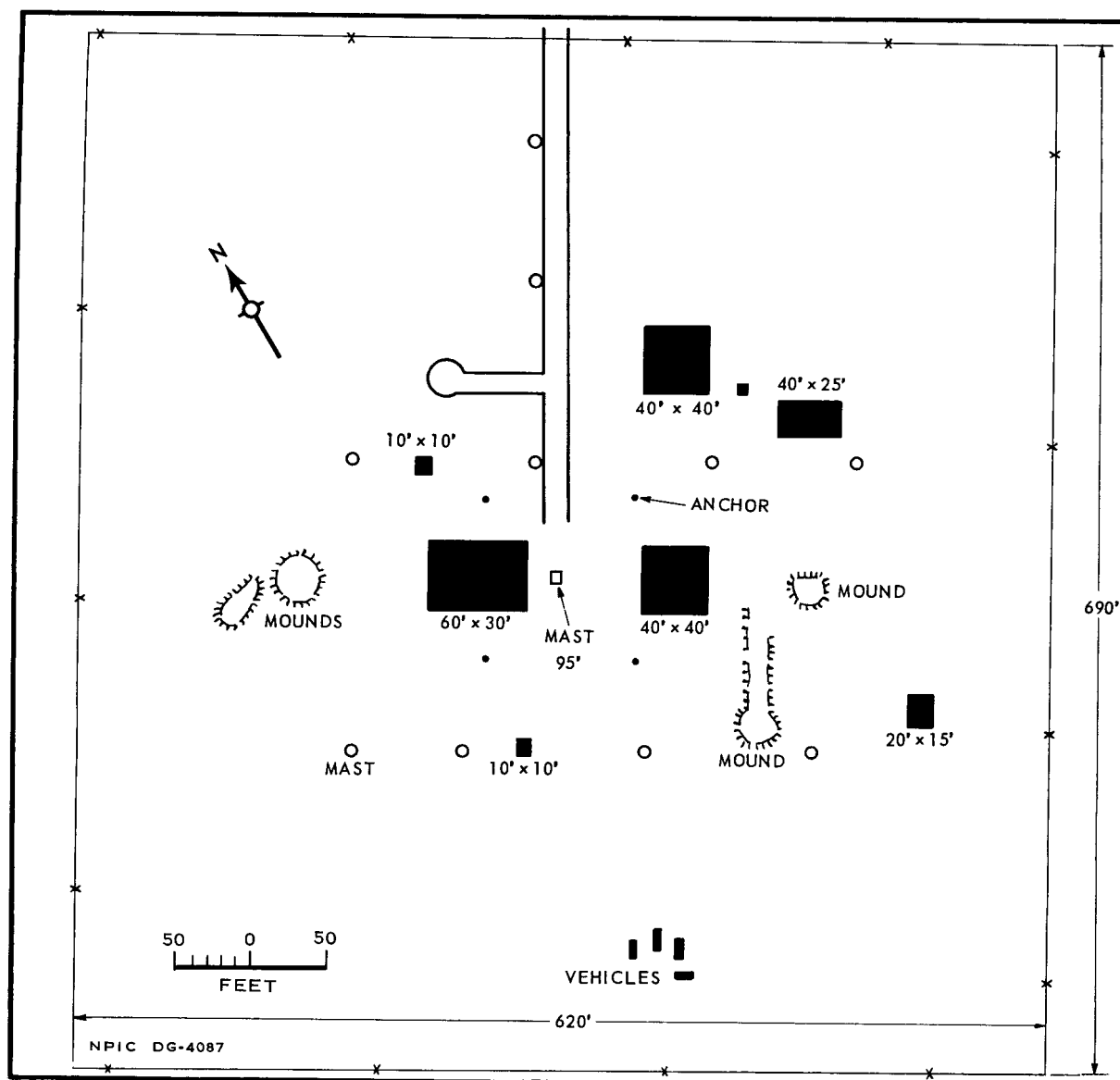


FIGURE 27. PROBABLE MICROWAVE TERMINAL. This facility may have additional functions.

on the mast, all seem to be oriented in the same direction, whereas a microwave terminal would cover all points of interest.

Three sites in the Impact Area appear to be microwave installations (see Figure 2), but orientations of dishes cannot be determined. In addition, the tall towers throughout the area may support microwave dishes which have not been identified on the photography.

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IMPACT AREA

West and northwest of the Support Base are ten instrumentation sites (sites 3-12) and two launch complexes (A and B) which circumscribe an area approximately 75 nm in diameter (see Figure 2). The sites and complexes are all located on hard-surfaced roads emanating from the Support Base. From the types of precision instrumentation and the fact that one of the launch complexes contains an SA-2-type site, it has been deduced that this is an impact area. While no actual impact points have been identified on the photography, this area will be referred to as the Impact Area.

It appears that the amount of electronic equipment is far in excess of that which can be attributed solely to ballistic-missile terminal-range activity. The activity here is consistent with an extensive investigation of the terminal phase of ballistic flights which would be necessary for the development of a countermissile weapon or for the development of electronic instruments directly related to a missile defense program.

The center of the Impact Area is located approximately 80 nm northwest of the Support Base and approximately 1,050 nm from the rangehead at Kapustin Yar.

Photography of the area extending on an azimuth of [REDACTED] toward Kapustin Yar was examined to ascertain if there were additional impact areas. A possible instrumentation site has been identified at approximately 46-49N 69-47E. Within 10 nm of this site are two unidentified areas of extensive track activity, but no vehicles or structures are present. Seven towers, 10-15 feet high, are irregularly spaced within a radius of 15 nm. A possible marker in the form of a "5" is positioned on the ground at 46-55N 69-37E. The presence of these items could indicate an impact area utilizing mobile equipment, but no impact points have been identified and no conclusions drawn. This area is located approximately 200 nm from Sary Shagan and 900-1,000 nm from Kapustin Yar.

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Launch Complex A

Launch Complex A is situated at 46-23N 72-52E, approximately 42 nm west-northwest of the Support Base and about 38 nm east-northeast of the center of the Impact Area (see Figure 28). Facilities comprising the launch complex are either still under construction or are recently completed and are widely dispersed over an area of level terrain which measures approximately 2.5 by 2 nm. These facilities include a Headquarters and Administrative Area, an Electronics Area, a Probable Missile Support Area, a Possible Central Control Area, two unidentified areas, a Possible Operational Support Area, and a SAM SA-2-type Launch Area (see Figure 29). In addition, there are several areas of unidentified activity within the launch complex.

A network of excellent all-weather roads services these facilities, and other all-weather roads connect the launch complex with the Support Base. In addition, a nearby airfield is adequate for liaison-type air traffic. An overhead power line and a large buried water line extend directly from the Support Base to Complex A. External communications for the launch complex are probably effected by microwave which apparently ties in with the Sary Shagan microwave net. Internal communications are provided by a network of buried cable lines interconnecting the several areas. The launch complex seems to be well established and autonomous, with a minimum of 1,600 persons involved in its operations.

Headquarters and Administrative Area

The Headquarters and Administrative Area is located in the southern sector of the launch complex. It consists of a housing section, a warehouse section, an open storage and motor pool section, and a possible electronics site (see Figure 30). This is the largest support area within the Impact Area and is probably served by at least 1,600 people. Obliquity precludes

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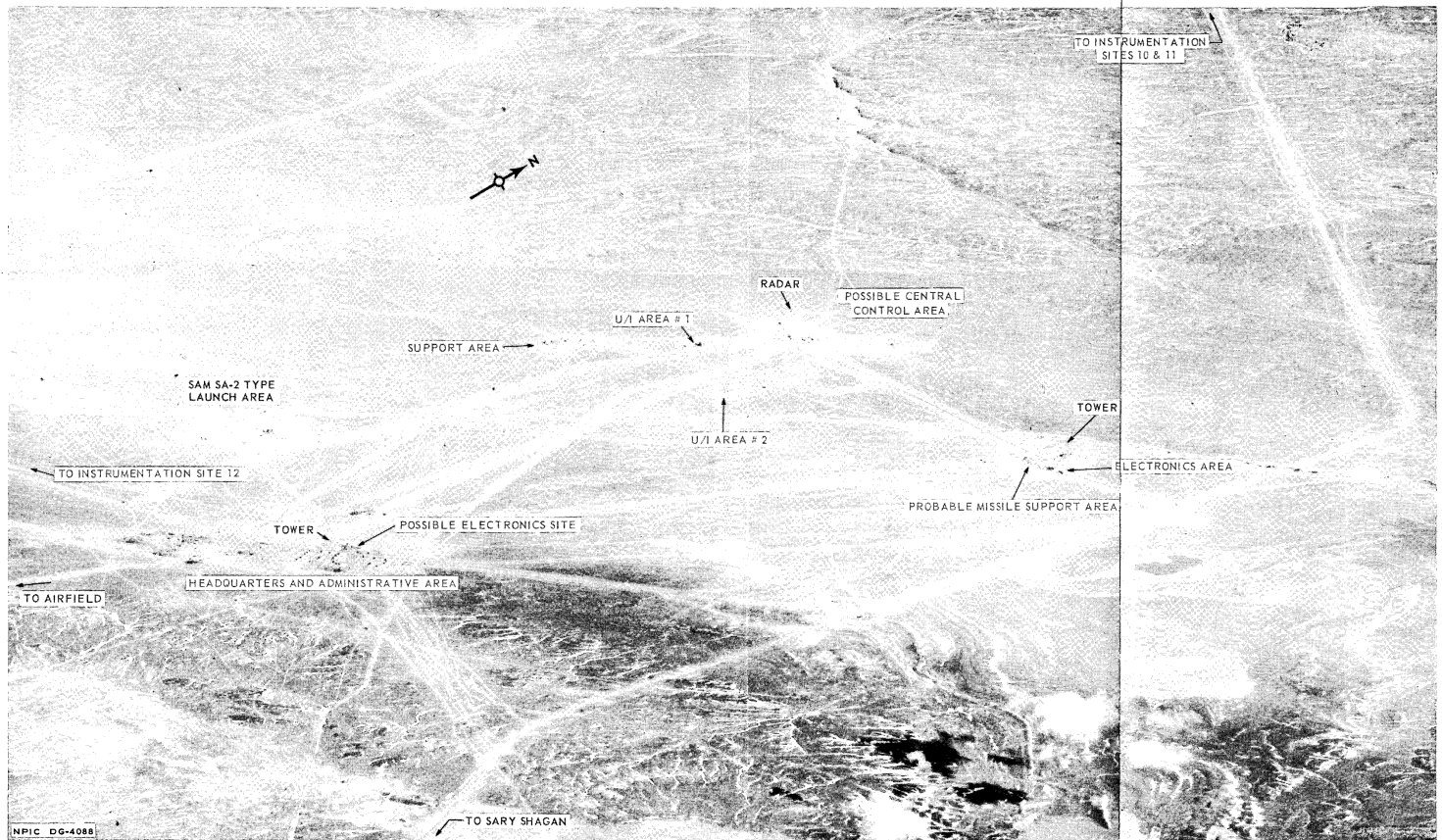


FIGURE 28. LAUNCH COMPLEX A. This complex is engaged in missile-system research and development and possibly the testing of an air-defense central control system.

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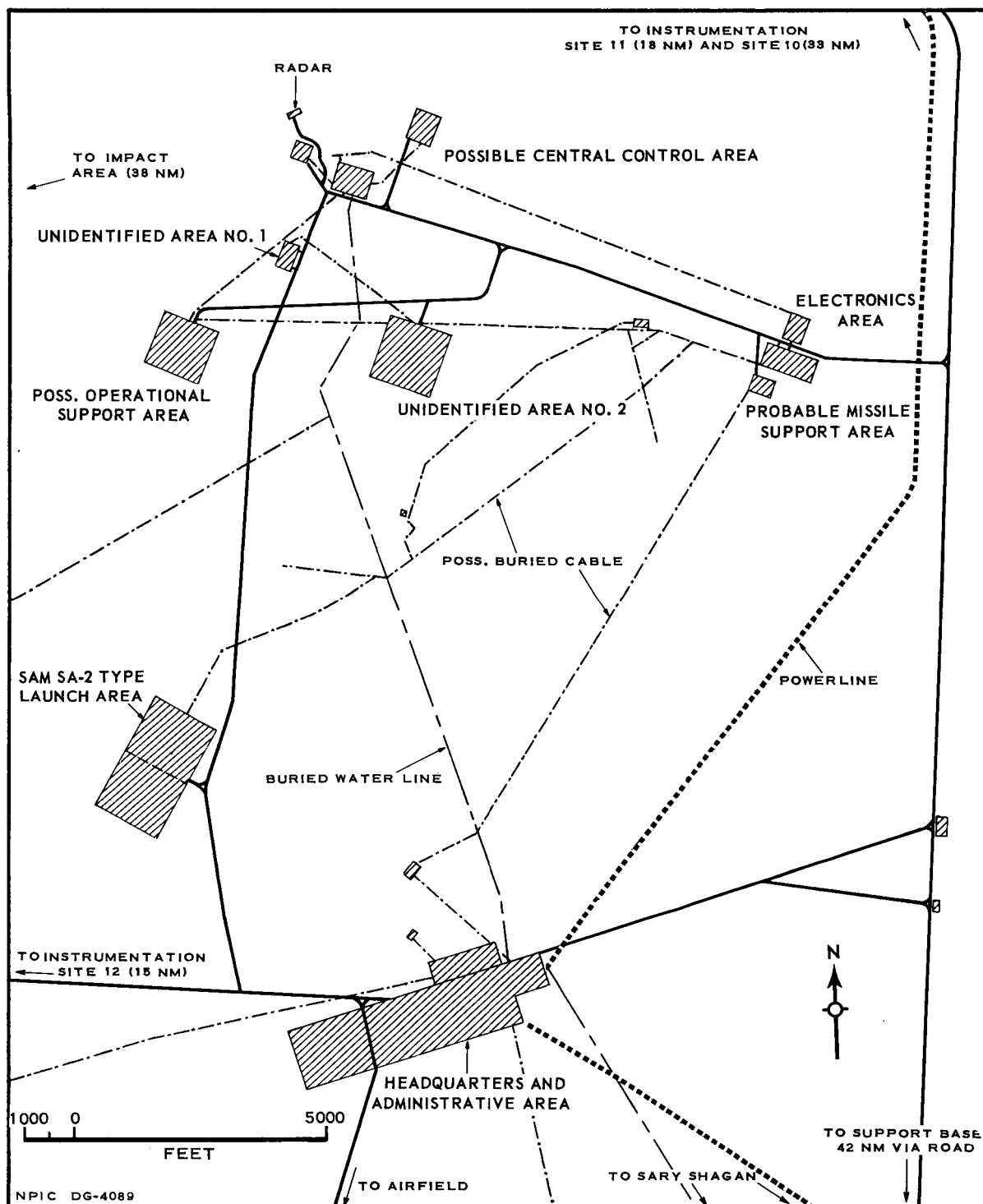


FIGURE 29. LAYOUT OF FACILITIES AT COMPLEX A. The complex has at least 1,600 persons involved in its operations.

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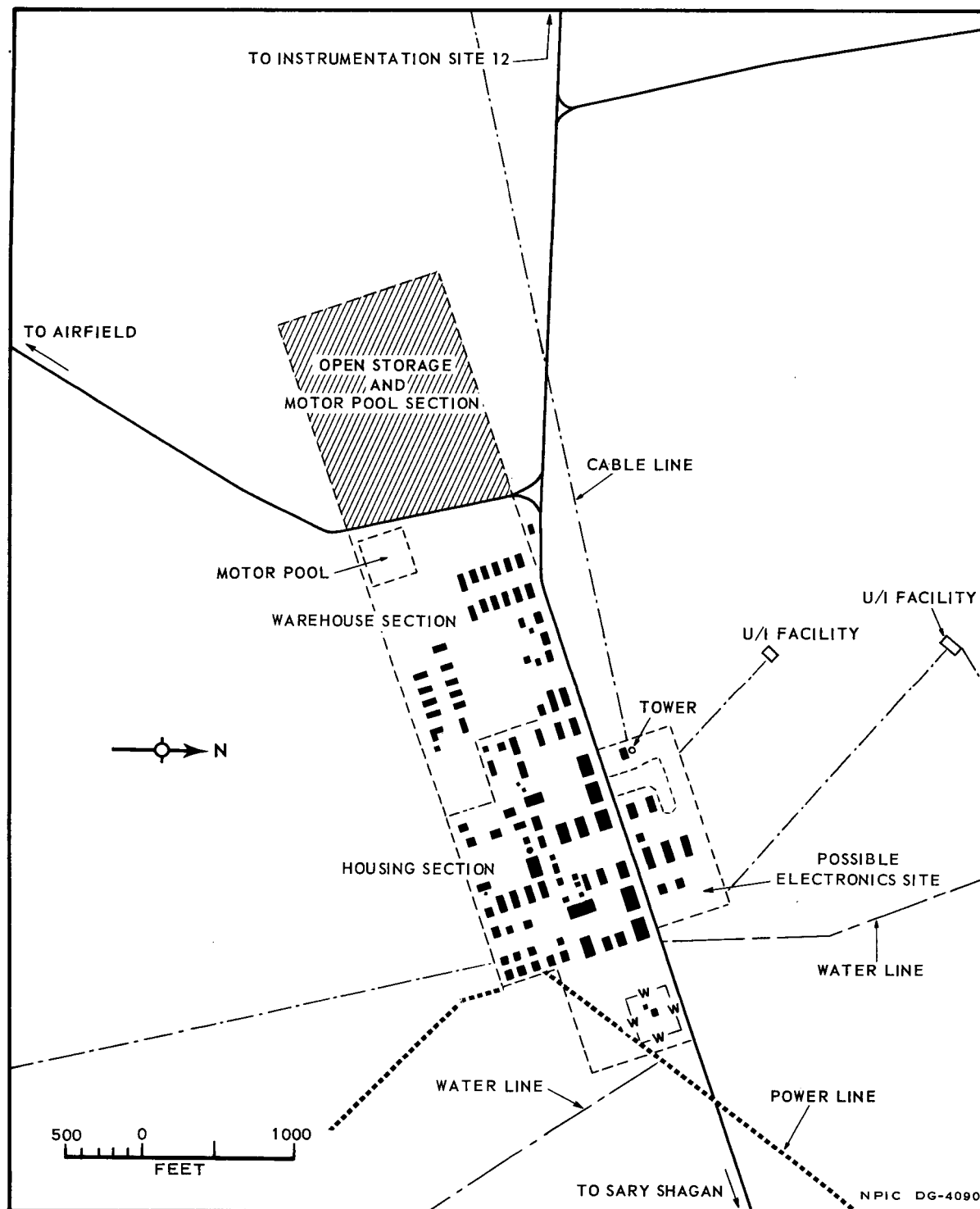


FIGURE 30. HEADQUARTERS AND ADMINISTRATIVE AREA, LAUNCH COMPLEX A. This is the largest support installation in the Impact Area.

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an estimate of the number of vehicles.

The housing section contains at least 60 buildings, including 12 two-story hip-roofed barracks with a possible capacity of more than 1,500 men; 14 single-story, long, gable-roofed buildings; 9 possible duplex or single housing units; a steam plant; a water standpipe; and a large gable- or arch-roofed community building.

The warehouse section contains at least 30 buildings, including 21 "zero-height" storage warehouses, an L-shaped probable barracks, and a gable-roofed barracks. There is a motor pool in the southwest corner.

The open storage and motor pool section, possibly for construction material, looks like a "dump"-type storage site. It contains several vehicle parks. No specific equipment can be identified.

The possible electronics site, which may provide headquarters communications, contains a microwave tower and at least eight buildings.

Electronics Area

This area, located in the northeastern sector of the launch complex, measures approximately 450 by 300 feet and is secured by a single wire fence (see Figure 31). The chief feature of the area is a 350-foot self-supporting tower with an associated building near its base. A second building is situated at the southeastern corner of the area, and several unidentified objects are also within the fenced enclosure. Outside the fence is a small area of unidentified activity. A probable buried cable extends from the Electronics Area to the Possible Central Control Area.

Probable Missile Support Area

The Probable Missile Support Area, located opposite the Electronics Area, covers an area approximately 1,300 by 1,000 feet (see Figure 31). The area appears to be under construction and not to be secured. The dominant structure in the area is a large, road-served, probable drive-through assembly-type building which measures approximately 100 by 75

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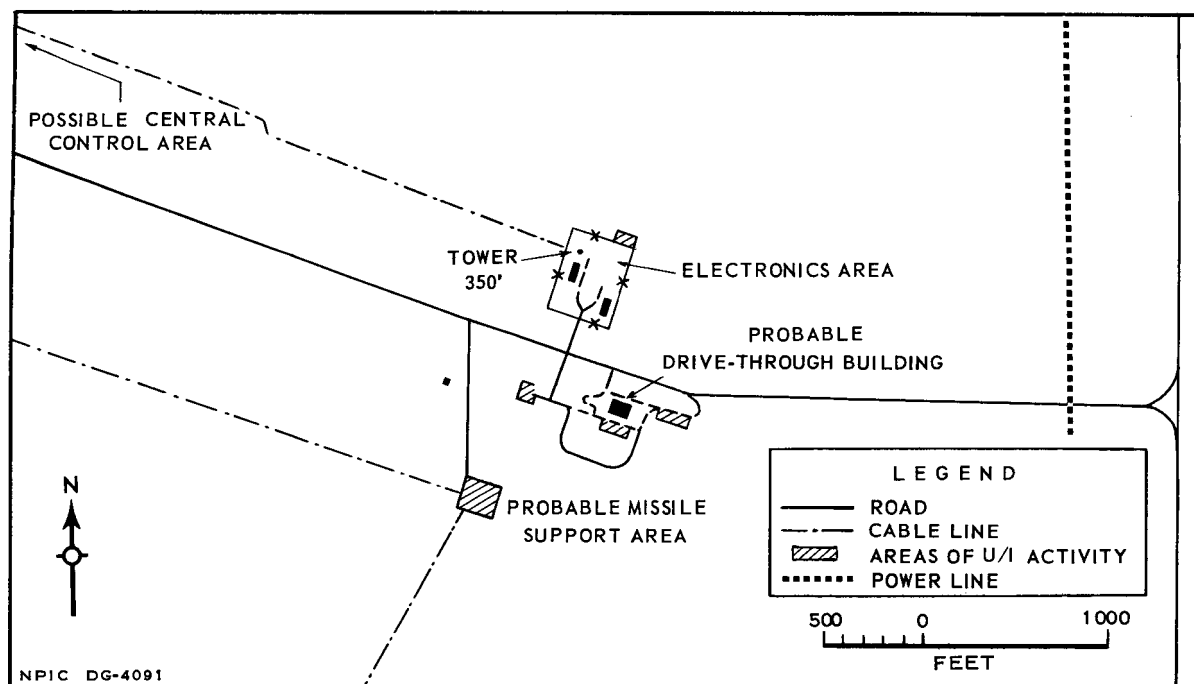


FIGURE 31. ELECTRONICS AREA AND PROBABLE MISSILE SUPPORT AREA, COMPLEX A. These areas are in the northeast portion of the launch complex.

feet. Within the area is a network of service roads including a loop road similar to those found at other missile-handling facilities. There is no evidence of a building or other structure along this loop road; however, along the other service roads are several areas of unidentified activity. The general characteristics of the area suggest that it will be associated with a mission of missile handling.

Possible Central Control Area

The Possible Central Control Area is located in the northwestern sector of the launch complex (see Figure 32). It includes a possible control center, a TOKEN-type radar site, and two unidentified sites (east and west) under construction. A buried water line extends to the area from the Headquarters and Administrative Area.

At the time of photography, the possible control center either had been recently completed or was in the final stage of construction, as evidenced by the numerous ground scars in the vicinity. There is a marked

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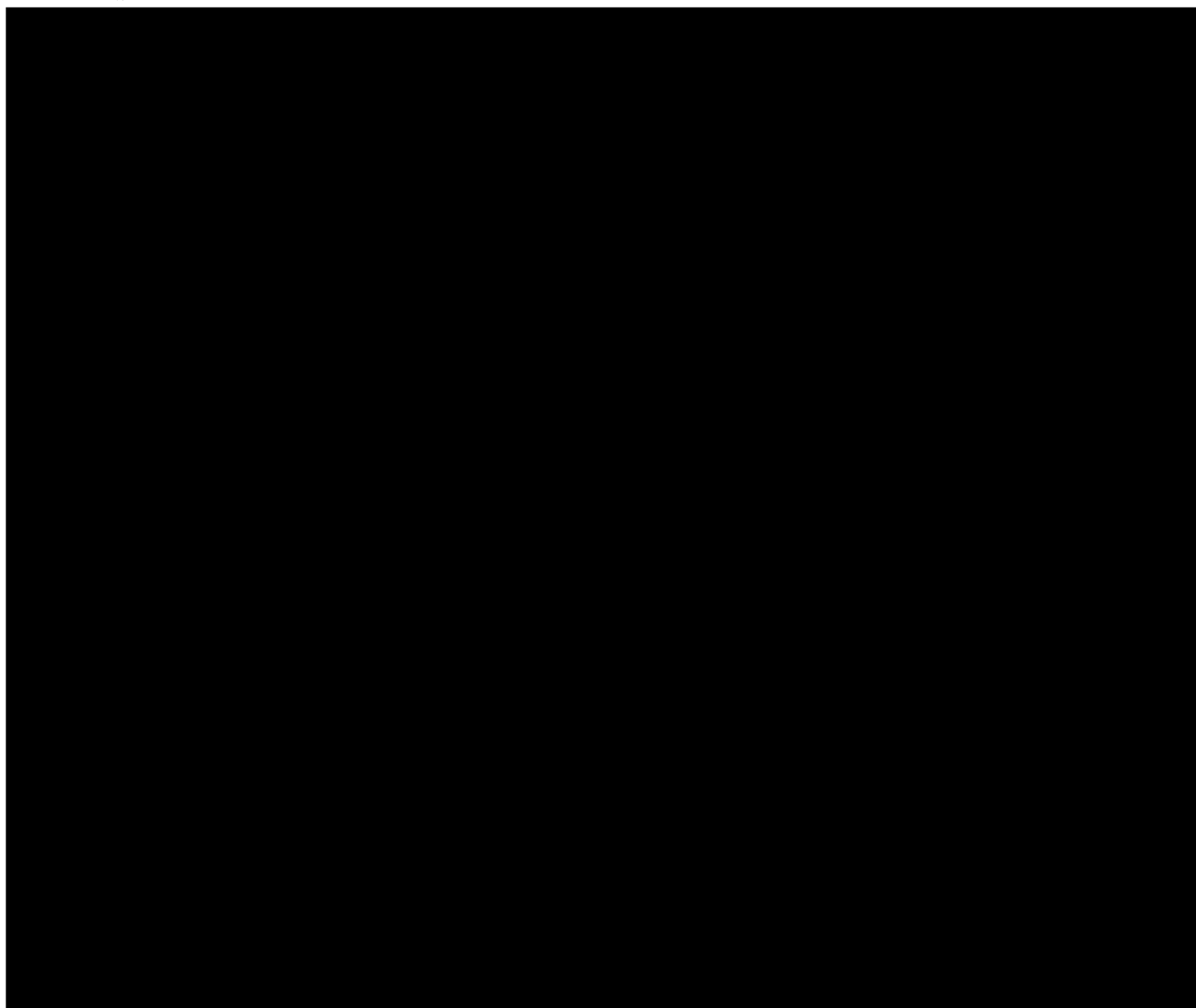
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boundary delineating an area 670 feet square. The center is road served and is supplied with large amounts of water by a pipeline from the Headquarters and Administrative Area. In addition, probable buried cable lines connect the center with the Electronics Area and other nearby sites. The center contains a large modified L-shaped building, at least four smaller support buildings, and a circular walled area with an object in the middle. The approximate mensural data for these items accompany Figure 32.

The TOKEN-type radar site is 1,550 feet northwest of the possible control center and may be associated with the center. The radar appears to be positioned on a mound and has several supporting vehicles.

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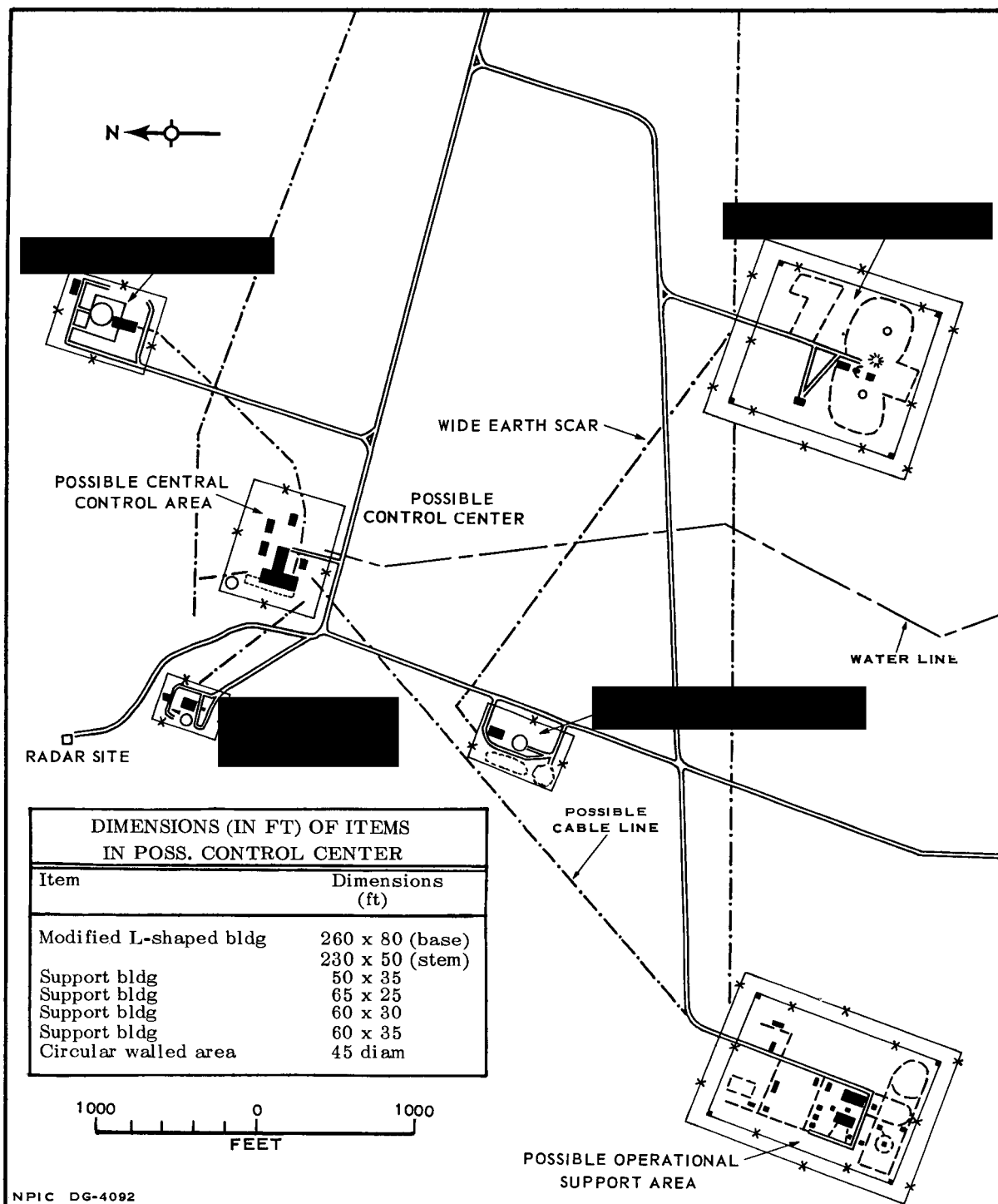


FIGURE 32. UNIDENTIFIED AREAS NO 1 AND 2, POSSIBLE OPERATIONAL SUPPORT AREA, AND POSSIBLE CENTRAL CONTROL AREA, COMPLEX A.

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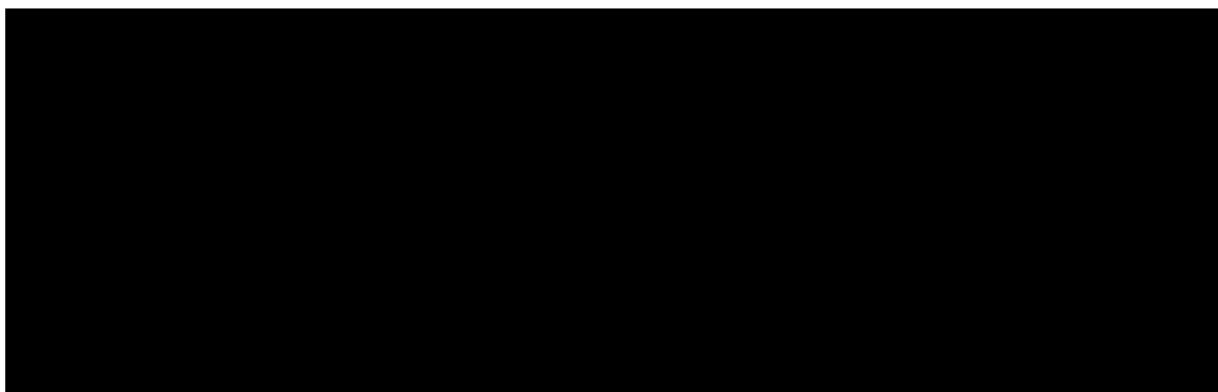
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Possible Operational Support Area

The Possible Operational Support Area, located in the northwestern section of Complex A is heavily secured and road served and appears to be operational.* The area is connected by a probable buried cable to both the Probable Missile Support Area and the possible control center. Security consists of two wire fences measuring 1,500 by 1,200 feet and 1,180 feet by 880 feet, guard towers, a patrol road, and a gatehouse (see Figure 32).

Structures in the area include two large buildings, of which the westernmost has an adjacent large apron along one side; approximately 18 small possible buildings; and a relatively short tower (possibly self-supporting). Most of the structures are west of the entrance road and are probably interconnected by an internal road network. Along the southern end of the site is a heavily scarred area of activity.

SAM SA-2-Type Launch Area

The SAM SA-2-Type Launch Area is located along the western extremity of the launch complex and consists of two launch sites within a secured area 2,600 by 1,400 feet (see Figure 33). The northern site, which could be operational, is more prominent on the photography than the southern site, possibly because the southern site is still under construction

*CIA interprets this area as an unidentified area with self-contained supporting elements.

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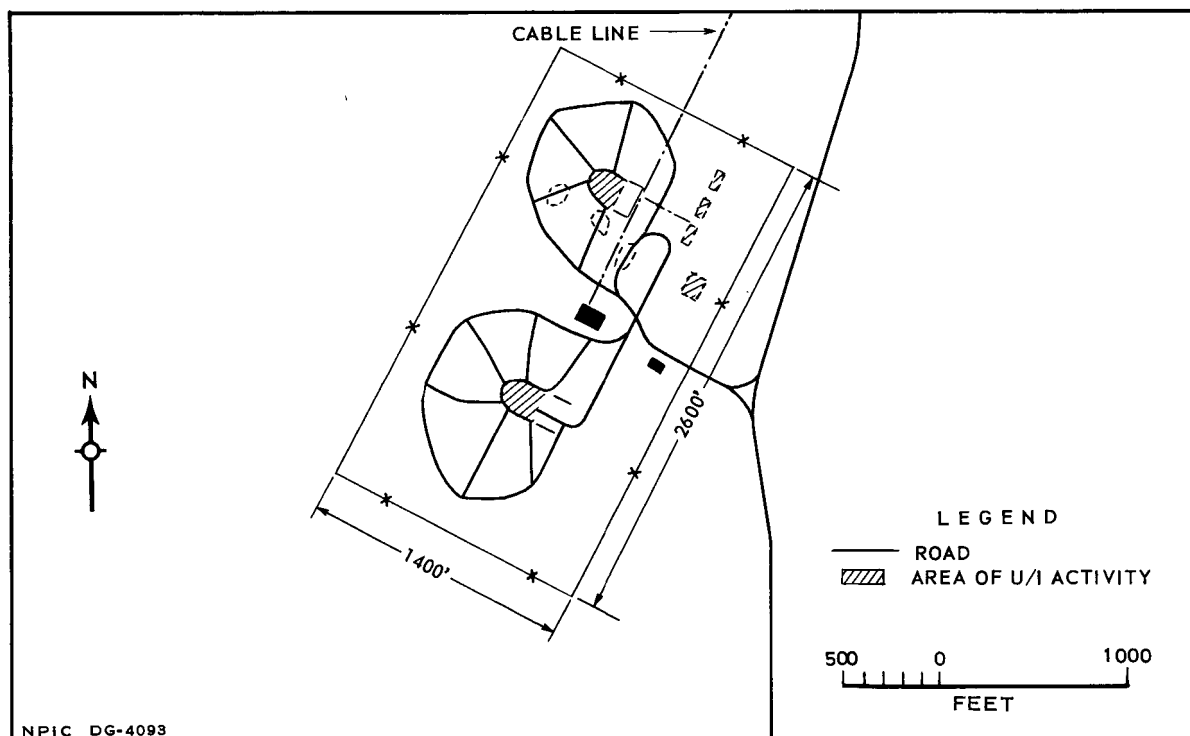


FIGURE 33. SAM SA-2-TYPE L LAUNCH AREA, COMPLEX A. Within the fenced area are two launch sites, apparently used for missile-system research and development.

and the northern site is either complete or in a later stage of construction. Several objects at the center of the northern site could be either construction equipment or components of a guidance facility.

Functional Analysis of Complex A

Launch Complex A appears to have a twofold mission involving both missile-system research and development, to include live firings, and possibly the testing of an air-defense central control system. The dual-emplaced SAM SA-2-type launch sites are not tactical sites for air defense of the launch complex, and therefore are positive evidence of a missile-system research and development program at the complex. It should be noted that none of the usual SA-2-type support facilities, as found at Kapustin Yar or at the deployed tactical sites, are found at Complex A. The Probable Missile Support Area, which appears to be under construction,

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could be utilized on completion for missile assembly and checkout; however, it is completely different from the usual SA-2-type support facilities. The fact that this area is under construction suggests an expansion of the missile-systems research and development program at Complex A, possibly to include the construction of additional launch sites at this launch complex. One or several of the other sites under construction in the complex could provide launch facilities for a different missile system or systems.

Launch Complex B

Launch Complex B, located 47 nm west-southwest of the Sary Shagan Support Base at 46-00N 72-33E, is the second missile launch complex at the Sary Shagan Antimissile Complex. This launch complex includes a Launch Area with associated instrumentation sites, a Support Area, a graded-earth airfield, and several unidentified areas (see Figure 34). An all-weather road, with paralleling water and power lines, connects the complex with Sary Shagan.

The launch complex was relatively cloud-free at the time of photography, with only the Launch Area and a portion of the Support Area partially obscured by clouds. Snow cover was intermittent and occasionally made interpretation difficult.

Launch Area

The Launch Area, 3.2 nm northwest of the Support Area, contains a number of structures and facilities unlike any previously identified at either Kapustin Yar or Tyura Tam (see Figure 35). It includes a single-fenced launch facility (Facility A) containing an irregularly shaped launch pad, a double-fenced probable launch facility (Facility B) containing two complex concrete probable launch pads *(see Figure 36), and an Assembly and Checkout Facility (see Figure 37). A network of four instrumentation

*See separate CIA discussion of Facility B on page 77.

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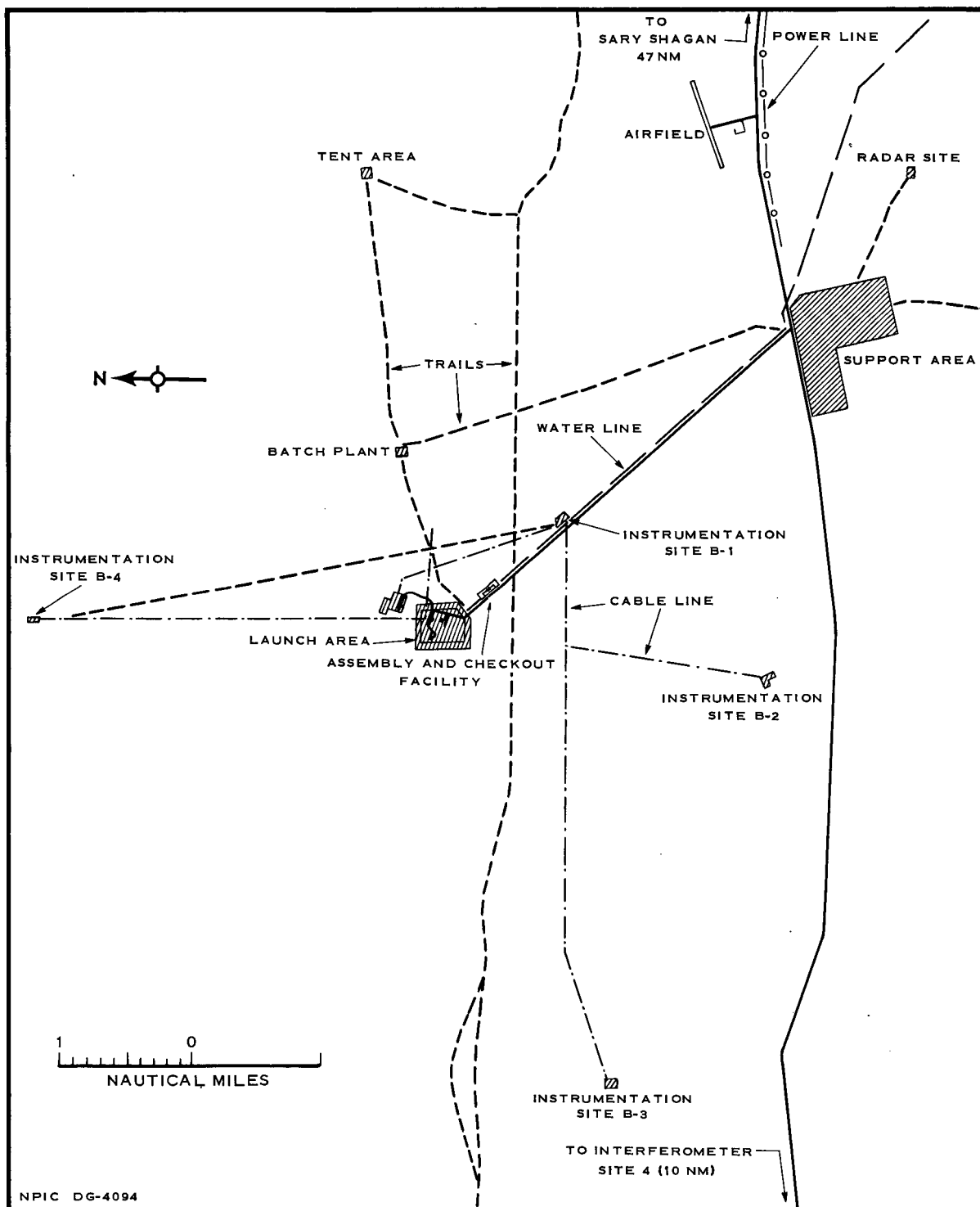


FIGURE 34. LAUNCH COMPLEX B. This is probably a developmental countermissile launch complex.

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sites (see Figure 38) interconnected by buried cable lines serves the Launch Area.

Snow cover and evidence of recent earth moving in the Launch Area suggest that at the time of photography the Launch Area was not operational but was being repaired and/or expanded. The apparent age of the various facilities -- particularly of the Assembly and Checkout Facility, where there is a substantial coal pile -- indicates that most of them had been in use at least 6 months, possibly more than a year. It cannot be positively determined whether actual firings have been conducted, although a darkened area on one side of one of the probable launch pads may have been caused by firings.

It appears that the double-fenced probable launch facility and the Assembly and Checkout Facility were constructed some time before the single-fenced launch facility, which at the time of photography was apparently being expanded.

The unique design of facilities in the Launch Area differs so radically from that of conventional surface-to-surface and surface-to-air missile site configurations that it suggests the development of a totally different system. In view of this design and the presence of the many long-range electronic facilities located throughout the Sary Shagan Antimissile Complex, Launch Complex B can best be postulated as a developmental countermissile launch complex. This hypothesis is substantiated not only by the novel configuration of the semicircular probable launch pads (see Figure 36), but also by their overall size, the apparent capability of trainable launchers, and the geographic location of the launch complex with respect to Kapustin Yar and Tyura Tam.

Facility A. This single-fenced launch facility is probably the newest of the facilities within the launch complex. Since the road connecting it with the Assembly and Checkout Facility passes through Facility B, vehicles traveling between the Assembly and Checkout Facility and Facility A must pass through six fence lines. This suggests that some component of Facility B must be utilized in processing a missile transported between

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the Assembly and Checkout Facility and Facility A. The traffic flow from B to A appears to bypass the two probable launch pads, indicating that such an intermediate processing point is not in their vicinity.

The significant items in Facility A include the following (see Figure 35). The roughly rectangular launch pad, partially covered by snow and measuring 300 by 110 feet, is in the southwest corner of the fenced area. The access road to this pad veers to the north after entering the fenced area, suggesting a requirement to leave a clear path for blast effects to the rear of the launch point. Near the center of the pad is a probable launcher or erector consisting of a pedestal with a near-horizontal rail 30 feet long positioned on top and aligned with the long axis of the pad. The rectangular shape of the pad and the evident requirement for a clear area to the rear suggest a low angle of launch along the long axis of the pad, which is oriented on an azimuth of [REDACTED]. A low launch angle would in turn require the use of a solid-propelled missile or booster, which is consistent with requirements for a countermissile.

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An earth-mounded bunker, connected to the launch pad by a buried cable, is located approximately 350 feet north-northeast of the launch or service structure. A second earth-mounded bunker and a revetted building are in the immediate vicinity. A number of vehicles are situated throughout the area. One of these, located adjacent to the eastern fence, resembles a WHIFF-type radar.

Security floodlights are located along most of the fence lines. Additional poles, probably also for floodlights, are spaced at random within the area, suggesting a need for round-the-clock construction activity.

Facility B. Clearly the more exotic facility, Facility B contains a number of structures for which no counterpart has been found at any missile launch area. The double-fenced area encompasses about 120 acres, and is approximately 50 percent cloud covered. Visible facilities include two semicircular probable launch pads (designated pads B-1 and B-2), a guyed lattice mast 180 feet high with two probable microwave dishes positioned on opposite sides, a square unidentified structure resembling a

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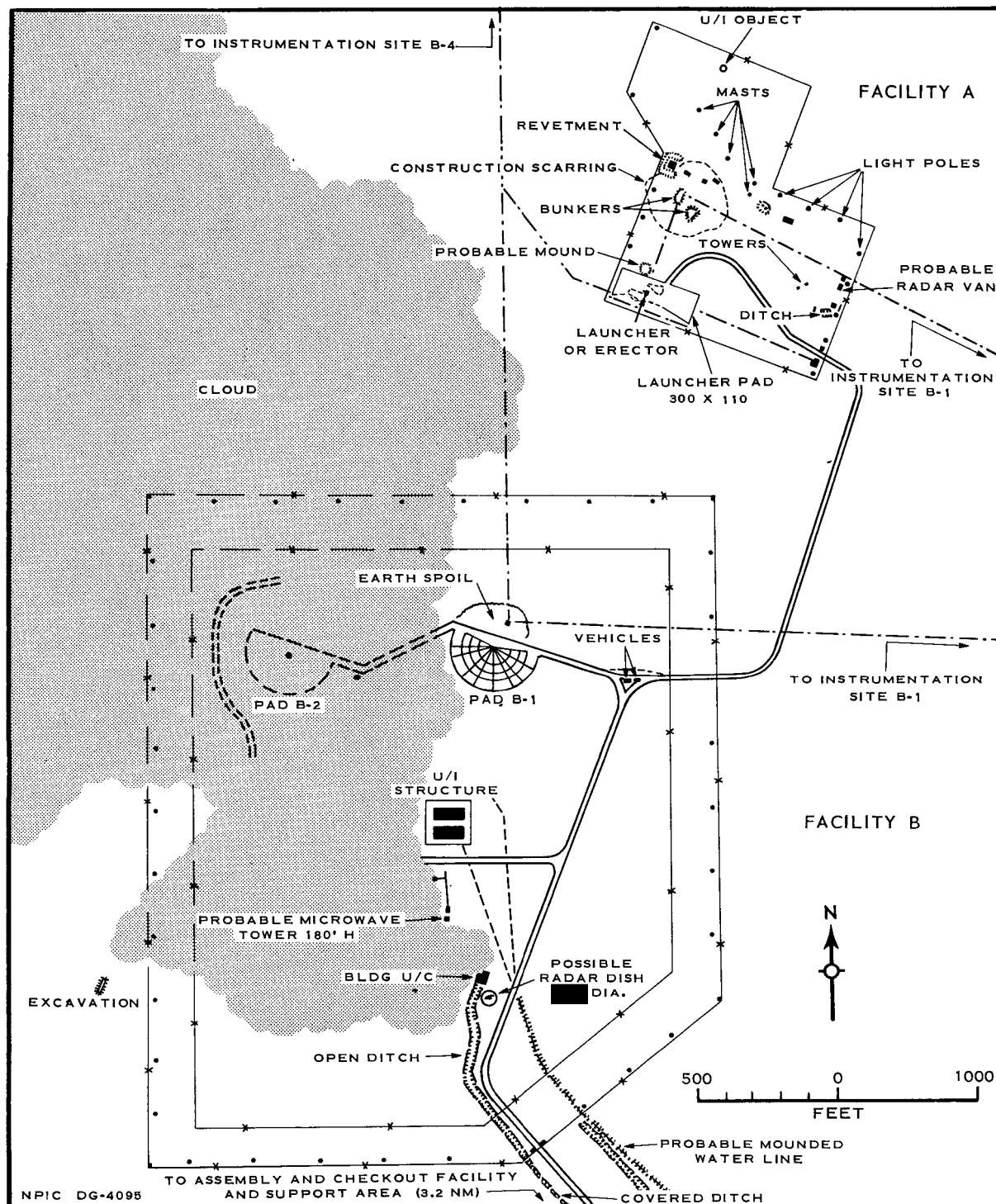


FIGURE 35. LAUNCH AREA OF COMPLEX B. Facility A has a rectangular launch pad and Facility B has two semicircular probable launch pads of unique design.

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building under construction, and a cleared circular area containing a possible parabolic reflector [REDACTED] in diameter (see Figure 35).

CIA does not tend to favor the launcher concept over an electronics or an unexplained concept but believes that the launch pad concept is negated by the following considerations:

1. The center line of the semicircular pads extends generally north-northeast; the center of the Impact Area is approximately 25 nm northwest of the pads. Therefore, any firing into this Impact Area would require a launch azimuth approaching the extreme edge of the pads. Intercept of ballistic missiles launched from Kapustin Yar should be made before their arrival at the Impact Area. If countermissiles were fired from this area, the line of fire would be over other installations in the Sary Shagan Antimissile Complex.

2. Three of the four instrumentation sites appear to be designed primarily for the support of Facility A.

3. If the Facility B pads are launch pads, they are the first such pads observed where the access road to one pad passed in front of another pad and terminated.

4. The darkened area on pad B-1, while possibly the result of blast, is just as easily the result of weather conditions.

5. The Army-Navy concept that Facility A is the newer area implies that the Soviets have gone from two large unique launch pads to one simpler concept. CIA feels that the more conventional concept would have been adopted initially.

The two semicircular probable launch pads are not visible in stereo, and only pad B-1 is visible on photography of a usable scale. Its configuration is unlike that of any known launch pad or any other construction

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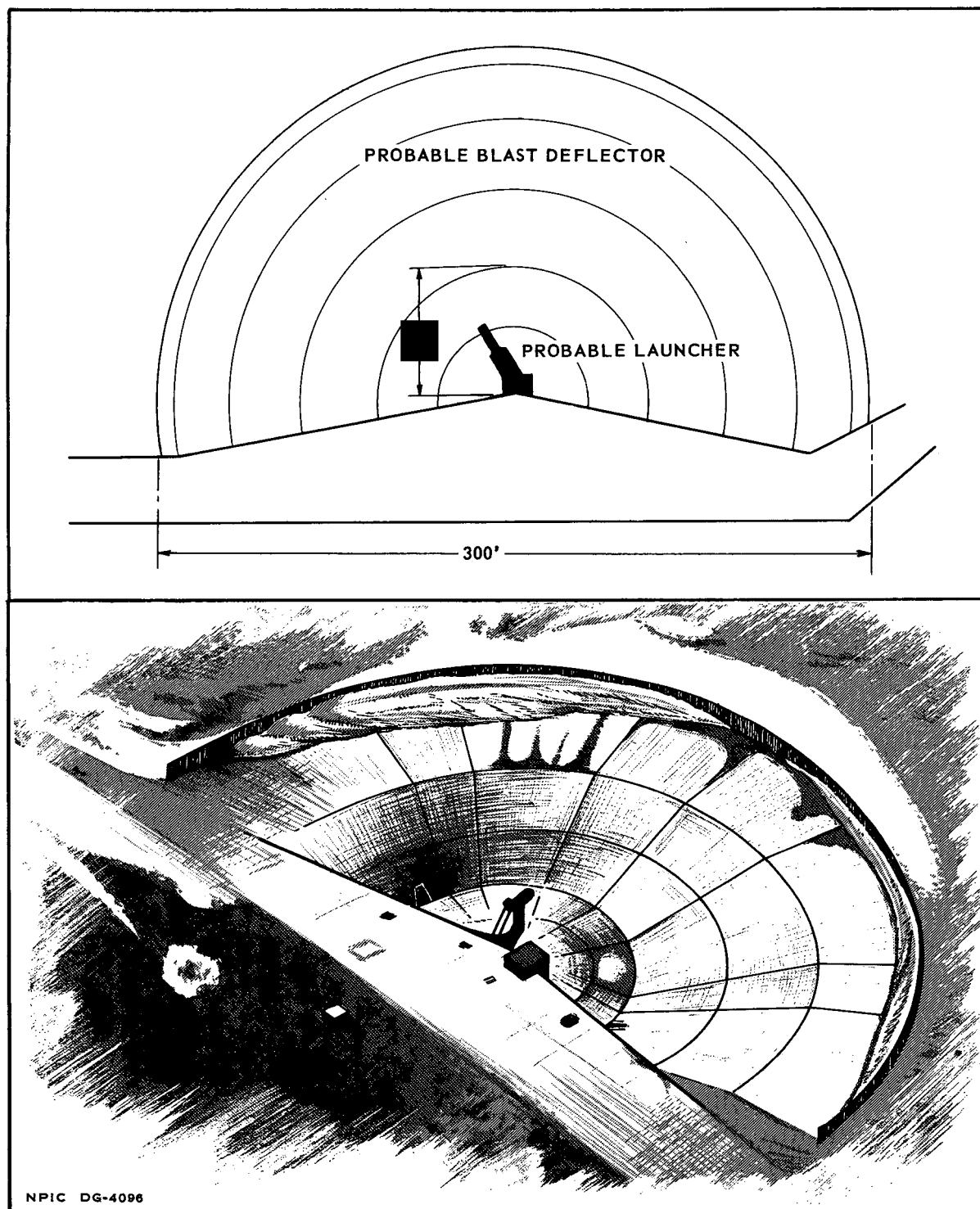


FIGURE 36. CONCEPT OF PAD B-1. This drawing shows the "amphitheater" shape of the pad.

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previously identified on photography. A perspective view showing the "amphitheater" shape of the pad is given in Figure 36.

The upper rim of the pad appears to be nearly level and flush with the roadway serving the facility. The sides of the "amphitheater" itself slope uniformly down to a flat semicircular area [REDACTED] in radius. At the center of curvature of the semicircle, probably mounted on the upper level, is an unusual structure, which, if pad B-1 is a launch pad, would most probably be a launch rail or service crane. While the shape of this structure is indistinct, it appears to be a beam or rail about 15 feet long, which could serve as either a launch rail or crane boom. Details of the wall beneath this structure cannot be determined because of the obliquity of photography.

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Dark scars along the southeast wall of the "amphitheater" could have been caused by burning propellants. While blast scars from liquid-propelled missiles are not evident on launch pads at Soviet installations, one site at Kapustin Yar -- probably associated with low-angle, solid-propelled missiles -- is characterized by extensive dark blast scars.

The depth of the "amphitheater" cannot be determined because of the lack of stereo coverage. However, a mound of earth spoil corresponding in area to pad B-1 is positioned just across the access road north of the pad.

A small square structure, also north of the road and opposite the center of curvature of pad B-1, is the apparent terminal point of two cable lines, one connected to Instrumentation Site B-1 (see Figure 34) and the other to Instrumentation Site B-4, 17,000 feet to the north.

A perpendicular to the base of the semicircle is oriented on an axis of [REDACTED] roughly in the direction of Launch Complex A.

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Pad B-2 is visible only on far oblique photography. While it is also semicircular and oriented in the same general direction as pad B-1, it cannot be determined whether it is flat or has the same "amphitheater" construction as pad B-1. Significantly, it does not appear to have the same crane or service structure as pad B-1. The object at the center of curva-

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ture of pad B-2 more nearly resembles a thick pole or mast.

The guyed lattice mast is approximately 180 feet high. Two probable microwave dishes are positioned approximately 110 feet up the mast and are oriented generally northeast-southwest. A small flat-roofed building, whose shape is indistinct, is positioned at the base of the mast.

The unidentified structure, near the center of Facility B, is probably under construction. It measures 135 feet square and is concrete and flush with the ground. About 200 short poles or beams are arranged in two rectangular patterns on its surface. The terminus of the road serving the structure is obscured by a cloud.

The cleared circular area, about 50 feet in diameter and paved with concrete, appears to support a parabolic reflector dish [REDACTED] in diameter. Immediately adjacent to the circular area is a building under construction. An open ditch, possibly for cabling, connects this building with a covered ditch leading to the vicinity of the Assembly and Checkout Facility.

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Assembly and Checkout Facility. This facility was probably constructed at the same time as Facility B, but was undergoing modification at the time of photography (see Figure 37). The access road nearest the Support Area is covered by snow and earth and has been cut by an open ditch serving a probable water tank which is being buried adjacent to the road. That portion of the road net which is unobstructed, however, shows signs of extensive use. All the buildings in the facility are complete, and a large coal pile is located next to the steam plant.

The most significant structure in the facility is a monitor-roofed drive-through assembly and checkout building measuring [REDACTED] feet. The monitor section is 55 feet wide and about 35 feet high. A wide access doorway, approximately 30 feet square, is visible at the northeast end of the building, and one is probably also present at the other end.

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The building is similar in size and configuration to other drive-through assembly and checkout buildings at other missile test centers, but differs from them in two respects: the road goes through the short axis of the

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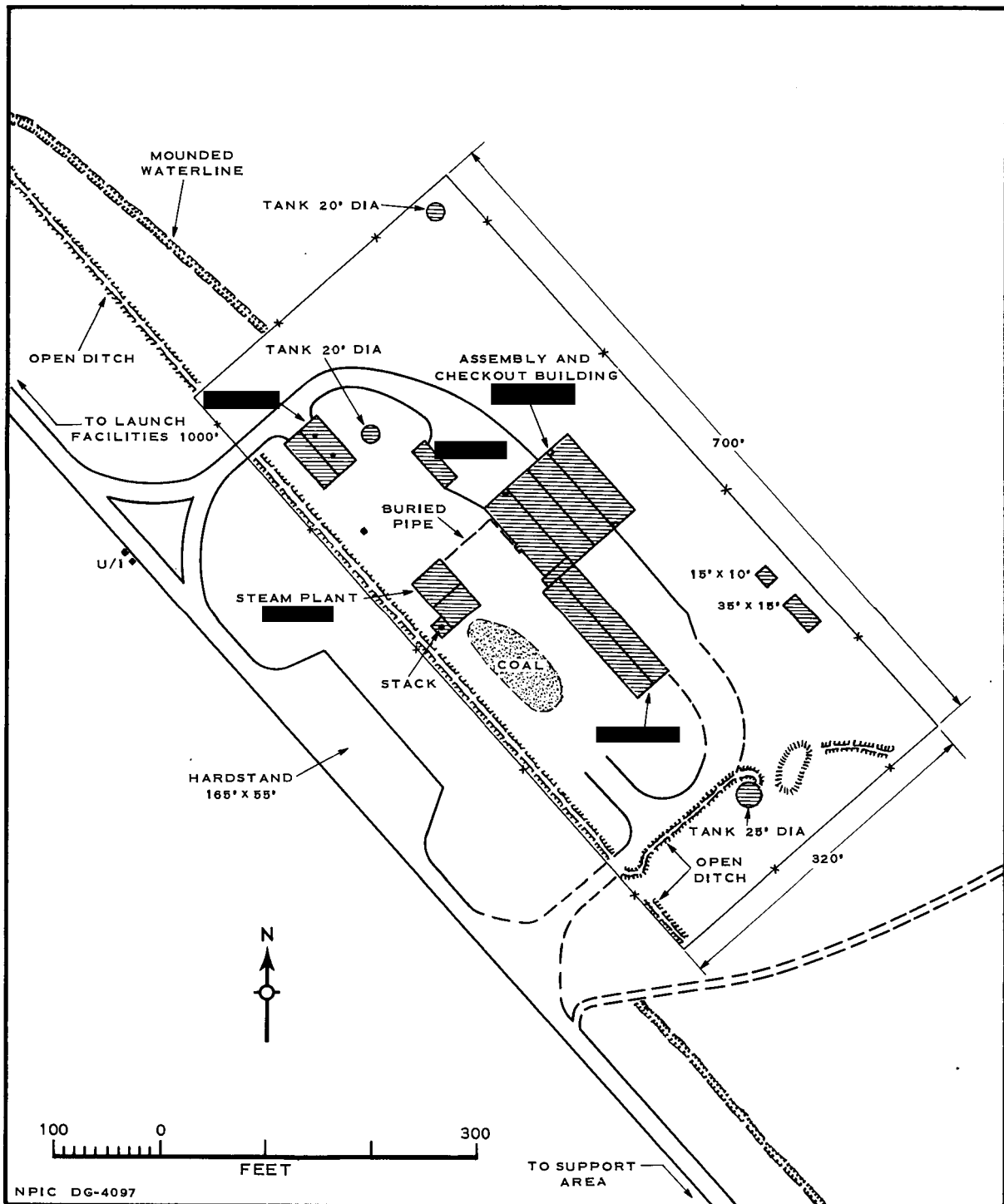


FIGURE 37. ASSEMBLY AND CHECKOUT FACILITY, COMPLEX B. The monitor-roofed drive-through building is the main feature of this facility.

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building, and attached to the building, on the southeast corner, is a shop or storage building [REDACTED] feet, which may have access to the loop service road along its entire length.

Other major structures within the facility are a gable-roofed building at the entrance nearest the launch facilities, probably utilized for housing, and a coal-fired steam plant with a stack approximately 60 feet high. A gable-roofed service building is located northwest of the assembly and checkout building, and two small service or storage buildings are positioned along the fence east of the assembly and checkout building.

Instrumentation Sites. The four instrumentation sites serving the Launch Area of Complex B are arranged in a roughly triangular pattern (see Figure 34), with three sites generally in line south of the Launch Area and one site north of the Launch Area. The three sites south of the Launch Area (sites B-1, 2, and 3) are all similar in general configuration, buildings, and equipment and are interconnected by buried cable lines. The fourth site (B-4), 17,000 feet north of the double-fenced probable launch facility, is connected directly to that facility by cable and only indirectly, by a branch cable line, to the other three sites. Detailed drawings of the four sites are given in Figure 38.

Sites B-1, B-2, and B-3 each contain a flat-roofed building with unidentifiable objects on top resembling optical instrumentation. Each of these three sites also contains a cleared hardstand on which vans or vehicles are parked. Common to all three sites, although varying in number, are several short masts or poles positioned at random. Each site is enclosed by a single wire fence irregular in shape. The three sites are on high ground and are probably intervisible.

Site B-4, which is not fenced, consists of a single flat-topped building with a probable optical instrument on top, connected by cable to the launch facilities and by road to Site B-1.

Buildings similar or identical to the observation buildings at all four sites have been identified at instrumentation sites at Kapustin Yar, indicating that these instrumentation sites follow an established Soviet doctrine.

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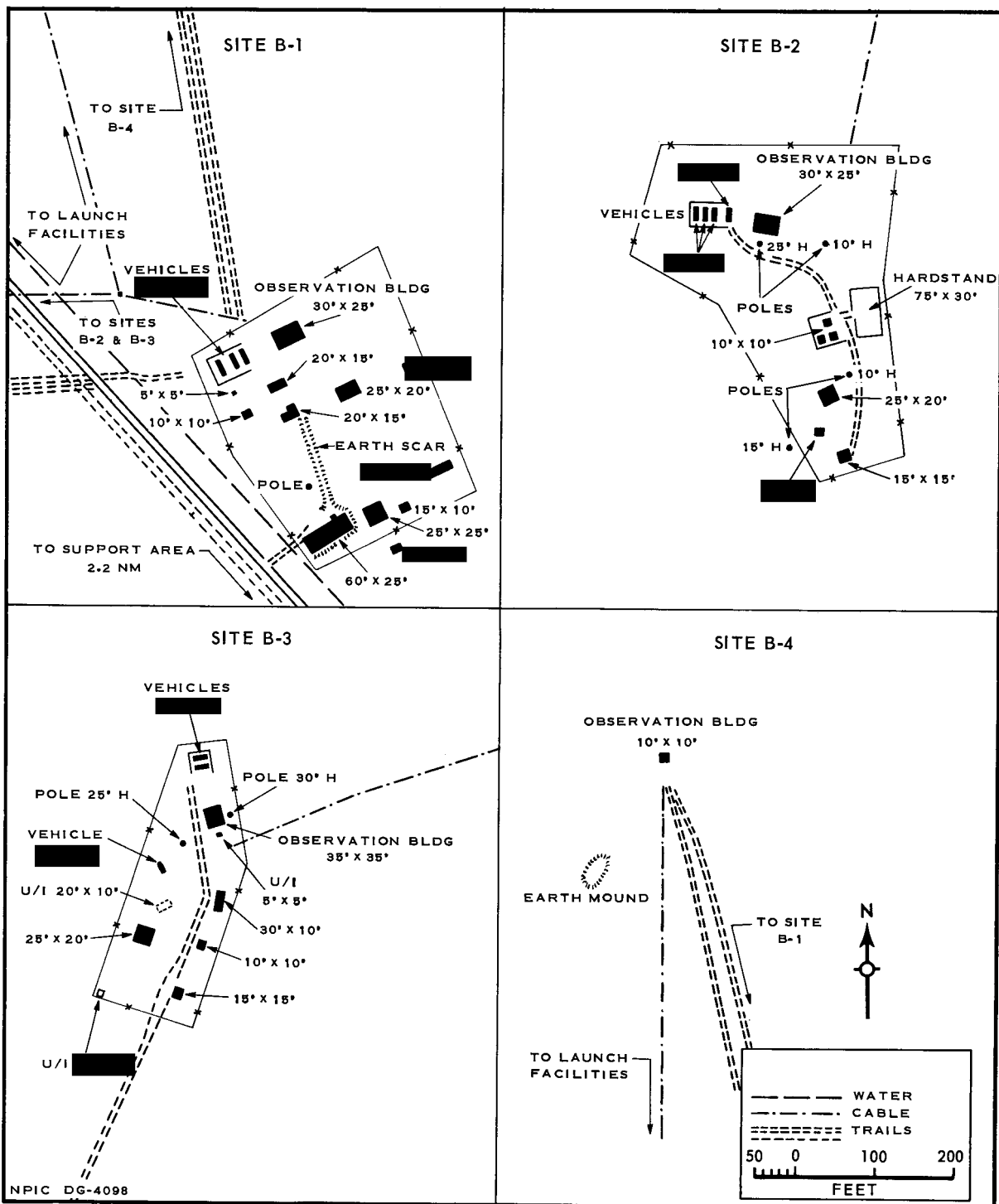


FIGURE 38. INSTRUMENTATION SITES, COMPLEX B. Three sites are south and one is north of the Launch Area.

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Support Area

The Support Area, located just south of the all-weather road connecting the Support Base and various installations to the south and west, contains headquarters and housing facilities, permanent and temporary storage facilities, laboratory and technical facilities, and a probable storage, assembly, and checkout facility under construction. The area appears adequate in size and has the diversity of facilities to provide the necessary operational support for Complex B, and has a possible additional capability of some minor construction support. Major components of the area (designated A through L on Figure 39) are discussed below.

Probable Storage, Assembly, and Checkout Facility Under Construction (Facility A). This, the newest facility in the Support Area, covers approximately 90 acres and is partially cloud covered. It has a network of looping roads, which are not yet surfaced, and contains five major buildings, at least two earth-mounded bunkers, and a number of cleared hardstands which may support buildings when the facility is completed. There is no visible security fence around the facility.

The presence of the loop roads suggests that the facility will have to handle long vehicular loads such as missiles, for which short turnaround radii are not practical. The two earth-mounded bunkers appear too small to accommodate large explosive components such as solid-propellant boosters, but could store explosive charges or small solid-propellant grains.

Without the addition of other roads, the facility is readily accessible to the Launch Area. Also, it is possible that another launch area, to be served by this facility, may be planned.

Vehicle Park (Facility B). This park is probably fenced and contains 18 to 20 vehicles.

Housing Facility (Facility C). Included in this facility are VIP quarters, personnel housing, and messing, recreational, headquarters, and administrative facilities. Data on those buildings capable of housing personnel are tabulated below. The figures on personnel capacity are based

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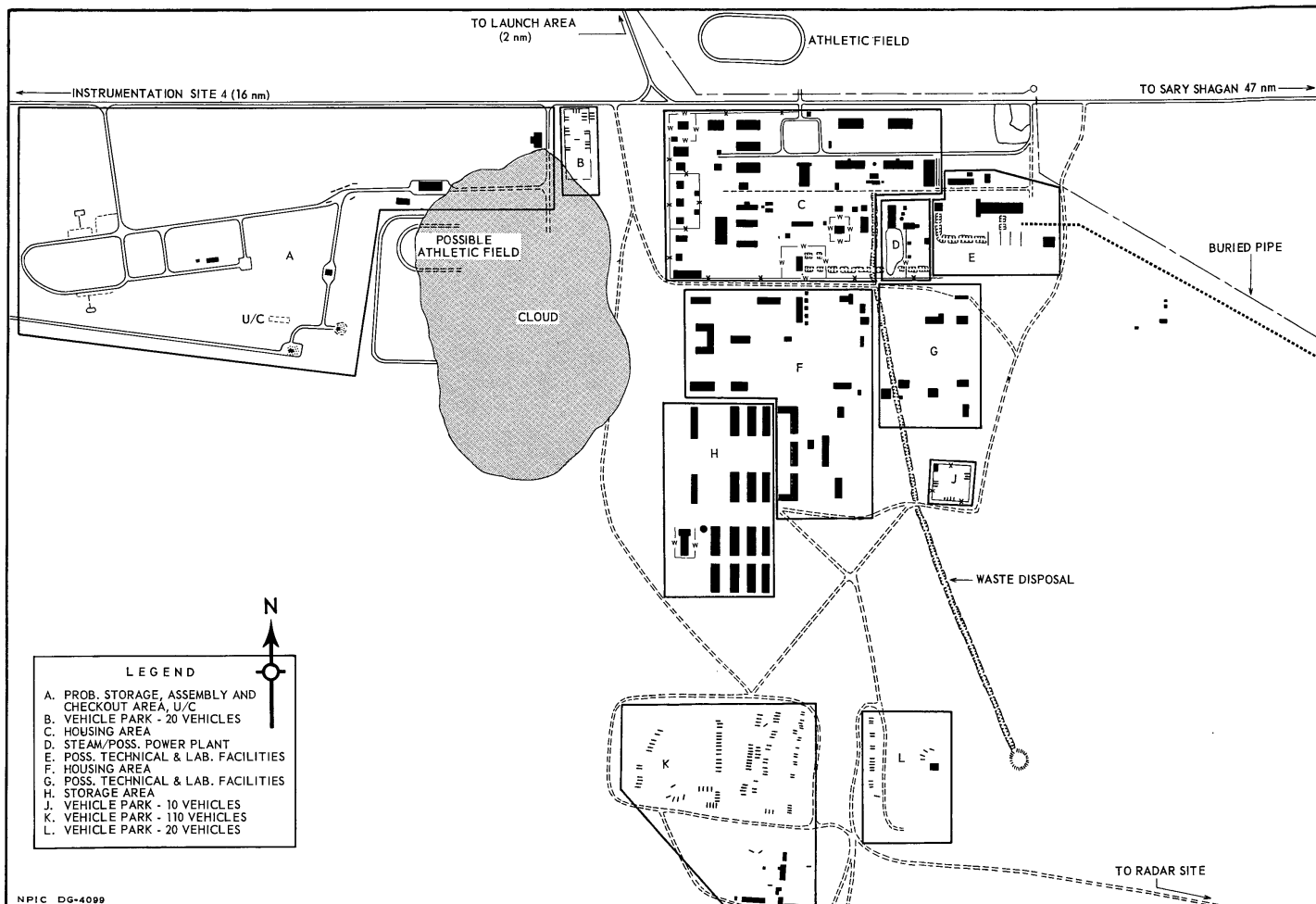


FIGURE 39. SUPPORT AREA, COMPLEX B. One of the major components is a probable storage, assembly, and checkout facility.

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on 150 square feet per person, resulting in minimum figures.

Table 4. Housing Facility, Launch Complex B					
No of Buildings	Roof Type	Dimensions (ft)	No of Stories	Floor Space (sq ft)	Personnel Capacity
2	Hip	70 x 40	2	11,200	75
2	Hip	140 x 60	1	16,800	112
3	Hip	110 x 40	1	13,200	88
2	Hip	[REDACTED]	2	29,920	200
3	Gable	[REDACTED]	1	7,560	50
1	Gable	130 x 40	1	5,200	35
1	Hip	80 x 35	1	2,800	18
1	Gable	50 x 35	1	1,750	12
2	Gable	140 x 45	1	12,600	84
Totals				101,030	674

The facility also contains nine single-story VIP-type quarters.

Steam Plant (Facility D). This coal-fired steam plant may also be capable of generating auxiliary electric power for the launch complex. The steam plant is a bilevel building with a stack. The lower level, without visible vents on the roof, could be a generator hall; adjacent to it is a possible transformer yard. The upper level has vents on the roof and is probably the boilerhouse. A network of open and buried steam-line ditches connects the plant with other buildings in the Support Area.

Possible Technical and Laboratory Facility (Facility E). Present in this facility are a small square monitor-roofed building, a T-shaped possible shop or laboratory building, a pyramidal-roofed building which may serve as housing, and an unidentified structure consisting of what resembles four parallel walls with darkened hardstands between them.

Housing Facility (Facility F). This facility includes some 25 single-story buildings, 13 of which are probably used for housing individual personnel. These 13 buildings have a total floor space of 43,000 square feet and can house about 300 personnel.

Possible Technical and Laboratory Facility (Facility G). Included in this facility are a number of single-story shop or laboratory buildings and a low mast or lattice tower enclosed by a fence. The buildings are

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widely dispersed, and considerable construction activity suggests that additional expansion is planned.

Storage Facility (Facility H). This facility has 14 single-story quonset-roofed storage buildings, two gable-roofed buildings which may be either warehouses or personnel housing, and a gable-roofed handling building with a monitor-roofed extension on the north end, which probably accommodates an overhead crane. The building is enclosed by a low wall; a semiburied storage tank is just east of the wall.

Vehicle Park (Facility J). This park contains ten vehicles and a small maintenance shed. The park is enclosed by a wire fence.

Vehicle Parks (Facilities K & L). These contain a total of 130 vehicles and 6 maintenance and storage buildings. Neither park is fenced.

Other Facilities

Several other facilities, both operational and logistical, provide additional support for Launch Complex B. These facilities are as follows (see Figure 34).

Airfield. A liaison-type airfield, with a graded-earth runway 4,200 feet long, is located 1.4 nm east-northeast of the Support Area. Next to the airfield is a fenced maintenance area containing five buildings. No aircraft are visible.

Radar Site. A TOKEN-type radar installation is emplaced on high ground 1.6 nm south of the airfield and 5,500 feet east of the Support Area. This site, which contains a small building in addition to the radar and associated vehicles, probably supports the airfield.

Batch Plant. Heavy track activity connects the Launch Area with a concrete batch plant 1.2 nm to the east. The plant was active at the time of photography.

Tent Area. This area, 2.1 nm east of the batch plant, contains some 35 tent bases. It appears abandoned, and the vehicle tracks leading through it have not been used for some time.

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Water Line. A buried pipe leads east from the Support Area. Its terminus is lost in a cloud, but it may terminate at a well. A line of poles possibly supporting power lines, parallels the buried pipe. At the Support Area the pipeline apparently serves a standpipe, then parallels the north side of the main road and branches north to serve the Launch Area.

Range Instrumentation

Of the 12 major instrumentation sites in the Sary Shagan Antimissile Complex, 8 are interferometer-type sites. Seven of these eight are in the Impact Area and the eighth is in the Support Base (see Figure 2). The similarities of the facilities at the seven interferometer sites in the Impact Area indicate that they have a similar function. These sites are 4, 5, 7, 8, 9, 11 and 12 (see Figures 40, 41, and 42).

These seven interferometer sites have the same general layout as far as the support facilities and the configuration of the interferometer is concerned. Each interferometer has a circular fence approximately 1,175 feet in diameter and an inner circular road or ditch roughly 1,000 feet in diameter. In the center of each circle is a cruciform pattern with arms 400 feet in length. This configuration is illustrated in Figure 41, which is a line drawing of Site 7. At similar sites in the USSR a dome is noticeable at the end of each arm and two domes on two adjacent arms. No domes are visible at any of these interferometer sites. At least two of the sites (7 and 8) have an associated TOKEN radar.

At least three of the sites appear to have either three or five adjacent buildings with 20-foot-diameter domes on them. None of the domes is open; however, a similar dome at Kapustin Yar is open and contains a WHIFF-type radar antenna. It is probable that at least some of these domes contain similar equipment; others may contain such equipment as telemetry antennas, infrared detectors, and optical, acoustical, or other types of tracking instruments. It is not believed that the domes are necessarily related directly to the phase-measuring devices.

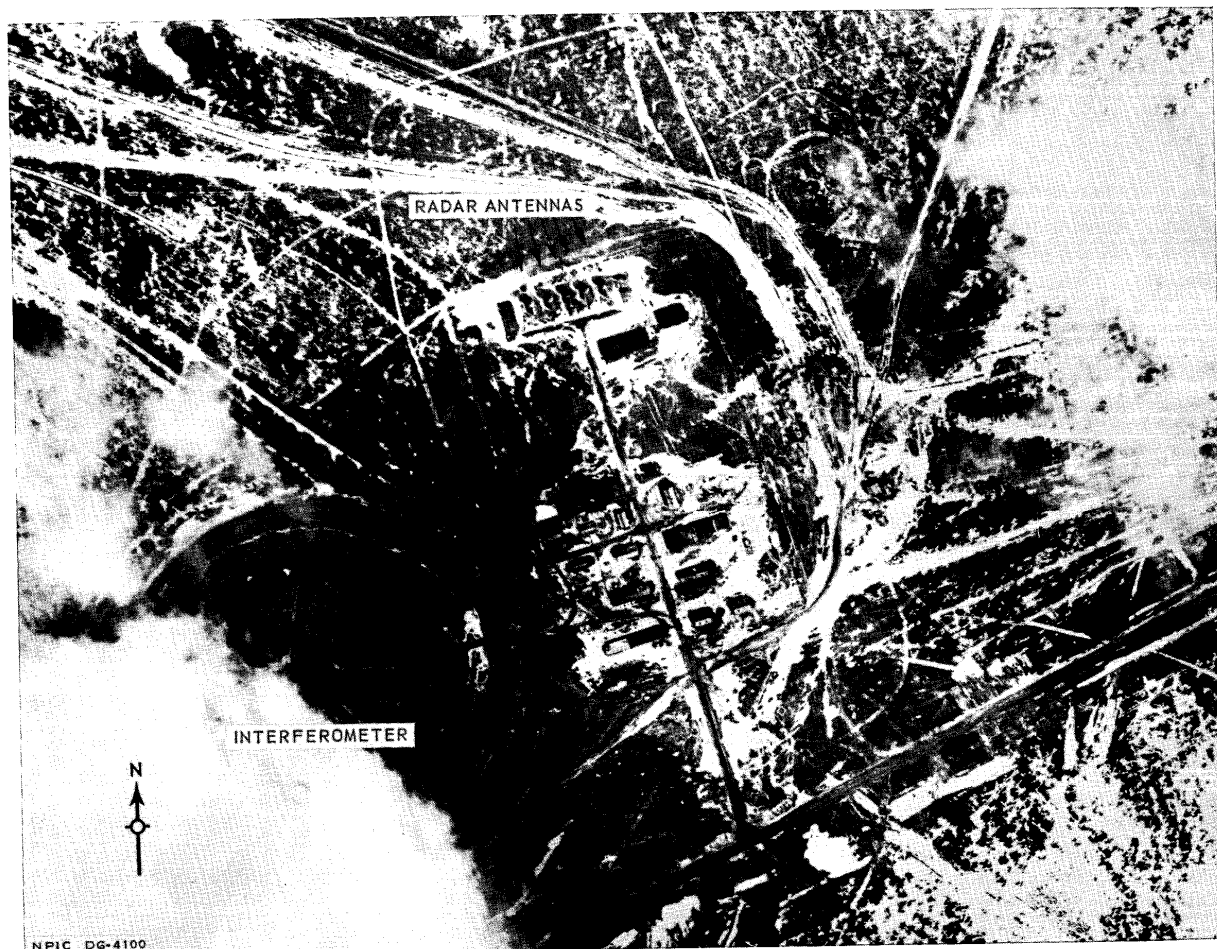


FIGURE 40. INSTRUMENTATION SITE 4. This is one of seven interferometer-type sites in the Impact Area.

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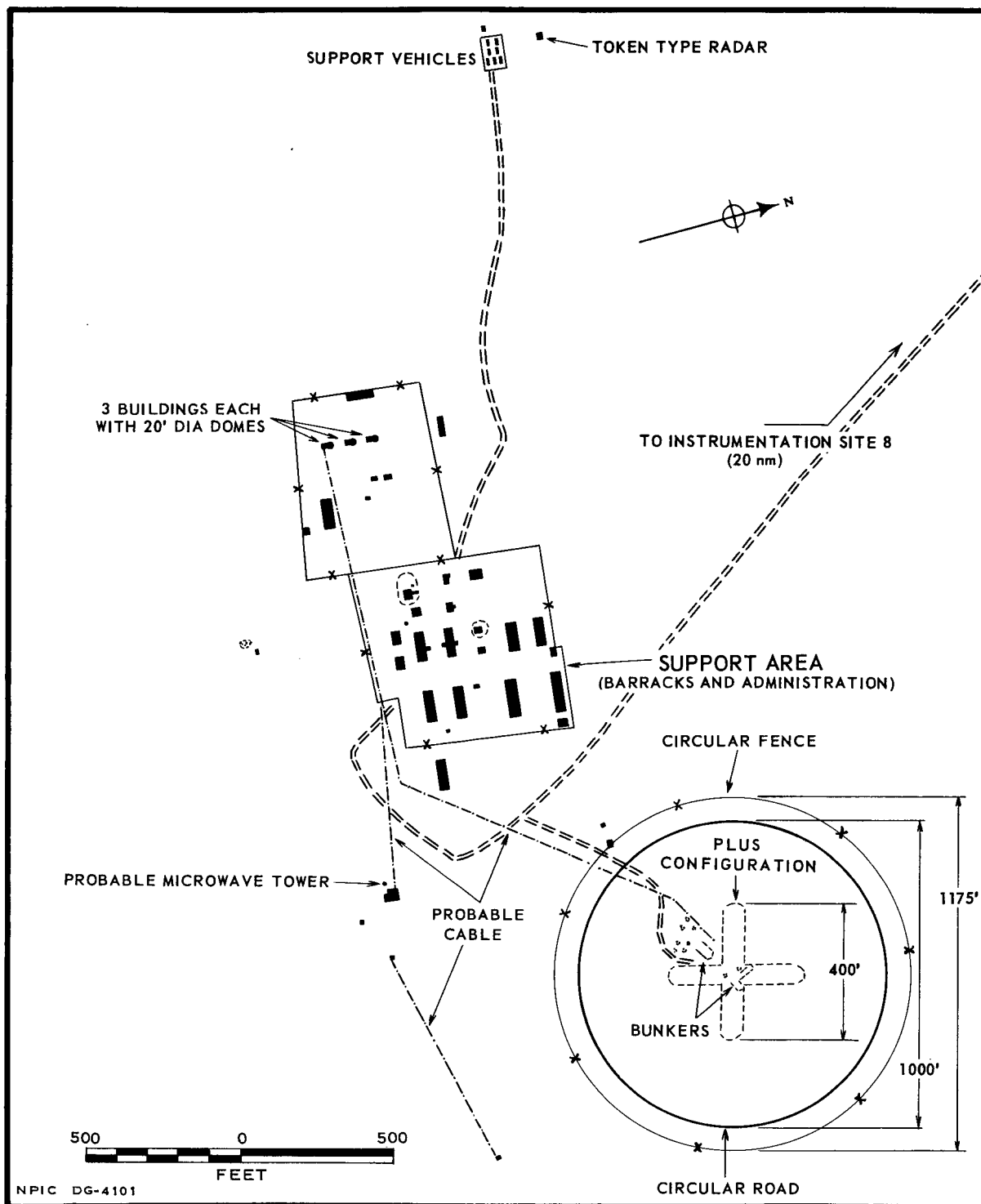


FIGURE 41. INSTRUMENTATION SITE 7. This drawing shows the cruciform (or plus) pattern of the interferometer.

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The function of these seven interferometer sites in the Impact Area is somewhat obscure, except that it is evident that the Soviets are interested in acquiring precise data in the vicinity of impact. This supports the conclusion that the Sary Shagan complex is preoccupied with antimissile measures. The exact function or mission of the site in the Support Base cannot be determined (see Instrumentation Site 1 and Figure 18). The data in the following table make possible a comparison of the eight interferometer sites.

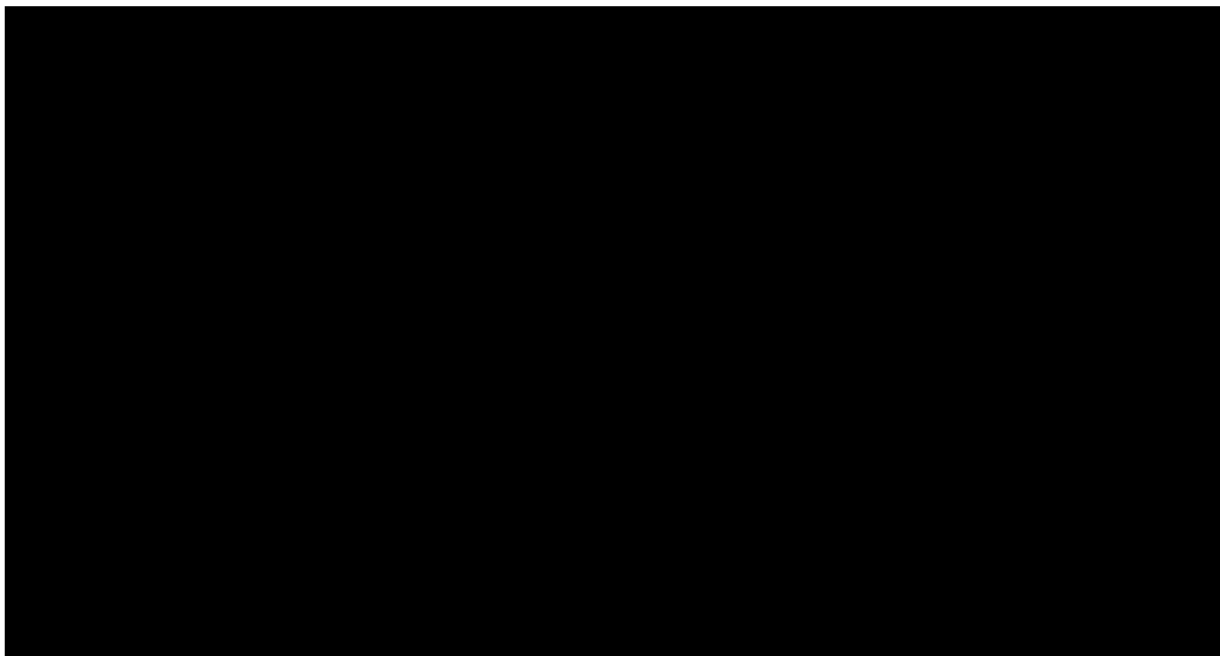
Table 5. Eight Interferometer-Type Instrumentation Sites				
Site	No of Major Bldgs	Total Floor Space (sqft)	Estimated No of Personnel	Remarks
1	4	6,900	--	--
4	18	45,000	100	Contains 5 domes
5	Unkn	Unkn	Unkn	Partially cloud covered
7	24	50,400	100	Contains 3 domes
8	23	61,700	175	Partially cloud covered
9	12	32,000	100	Partially cloud covered
11	12	34,200	125	Partially cloud covered
12	12	29,000	Unkn	Contains 5 domes

Instrumentation Sites 3 and 10

Instrumentation Site 3, at 45-40N 72-34E, and Site 10, at 46-55N 72-34E, lie roughly south and north, respectively, of the center of the Impact Area. They are similar in layout and probably have the same or a similar function (see Figure 43). Each is served by an improved road, a 4,000-foot airstrip, and a support facility capable of housing 250-400 workers and technicians. Operational facilities (see Figures 43, 44, and 45) consist of a group of buildings related to a cylindrical walled structure (which at Site 3 contains a [REDACTED] parabolic dish and at Site 10 the mount for a dish) and a tall self-supporting lattice tower approximately one nm away (see Figures 43, 44, and 45). In the operations area at each site is an unidentified structure which may be a tent or a dome. At both sites the structure is on the opposite side of the building adjacent to the cylindrical wall. Data showing slight differences and similarities between the two sites are given in Table 6.

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Instrumentation Site 6

Instrumentation Site 6 is located at 46-15N 70-58E. The most significant item at this site is a large dome, approximately 110 feet in diameter, probably mounted on a square pedestal (see Figure 46). Two possible applications of this dome are that it is a Luneberg lens or that it houses a more conventional type of radar system. As a matter of note, the relationship of this site to sites 3 and 10 may indicate that the dome covers a third [REDACTED] radar dish. In either case, the equipment is probably utilized to obtain data on incoming ballistic missiles for use in an antimissile research and development program.

The site itself is barely visible through a heavy cloud formation which covers most of the surrounding area. It is likely that there are other facilities, possibly another interferometer, that cannot be seen. Visible facilities include a housing and support area containing at least 23 barracks and support buildings and a possible drive-through building, a site of undetermined function, many dirt trails and ground scars, and a hard-surfaced road that leads back to Sary Shagan.

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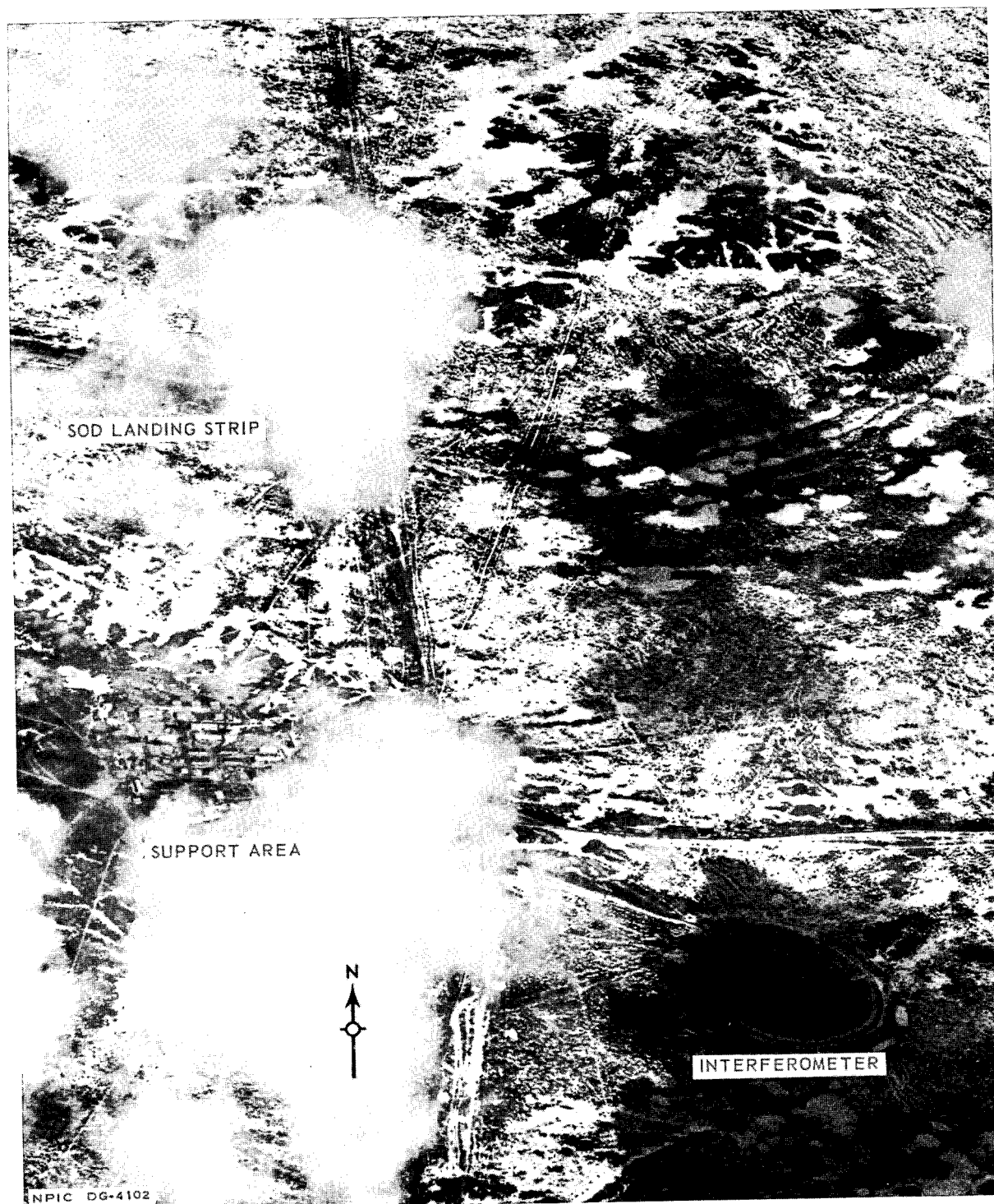


FIGURE 42. INSTRUMENTATION SITE 8. This is one of two interferometer-type sites with an associated TO-KEN radar.

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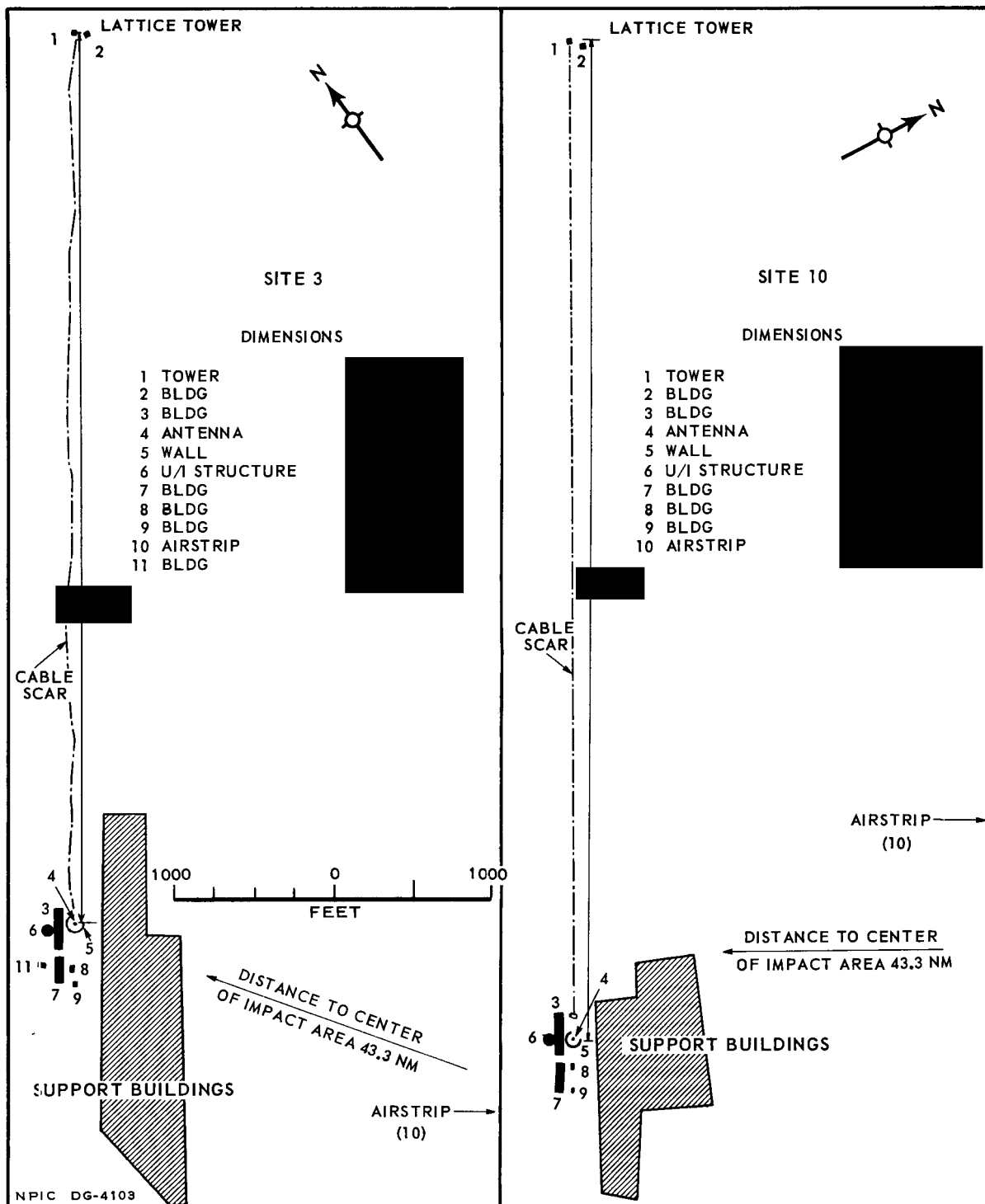


FIGURE 43. INSTRUMENTATION SITES 3 AND 10. The similarity of layout indicates that these sites probably have a similar function.

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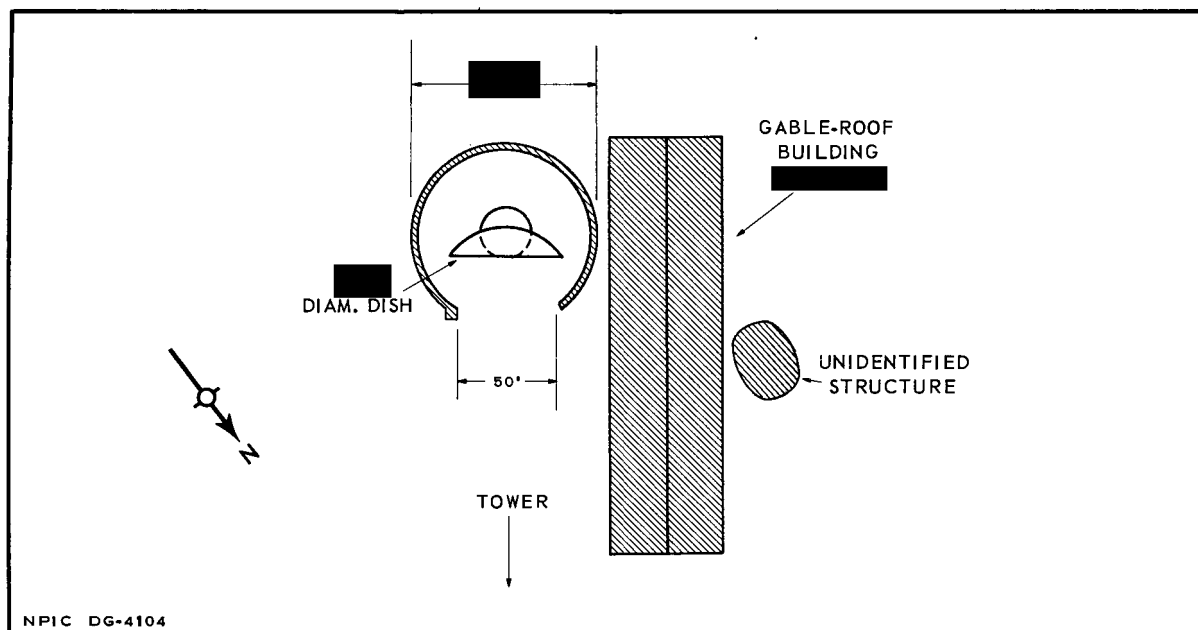


FIGURE 44. SKETCH OF [REDACTED] DISH AND NEARBY FACILITIES AT INSTRUMENTATION SITE 3. The unidentified structure may be a tent or dome.

Analysis of Sites 3, 6, and 10

Further analysis of the location of the instrumentation sites reveals a 75-nm triangular instrumentation pattern comprised of instrumentation sites 3, 6, and 10. These three sites form an equilateral triangle 75 nm (140 kilometers) on a side, as shown in Figure 47. Assuming the impact point to be centrally located within the triangle would place it at the intersection of the angular bisectors or, more precisely, at 46-17N 72-01E. The precise layout of this instrumentation pattern indicates that these three sites may operate as one system capable of obtaining high-resolution tracking data on incoming missiles.

Instrumentation Site 9

This site is 30 nm north of the center of the Impact Area and approximately 25 nm west of Site 10 at 46-50N 71-55E. It is located on the improved road extending west from Sary Shagan by way of Launch Complex A. Unimproved roads extend to the south.

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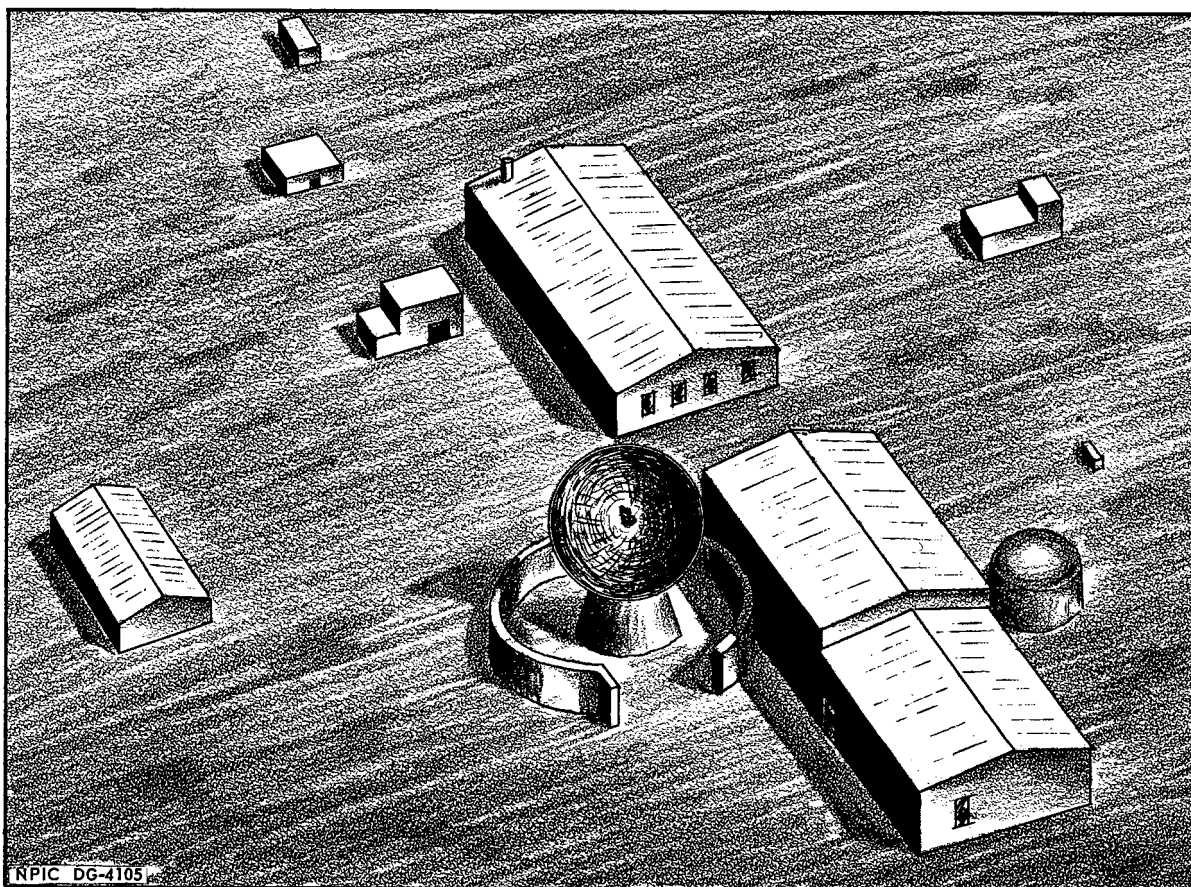


FIGURE 45. CONCEPT OF DISH AND NEARBY STRUCTURES AT SITE 3. These, with the tower, constitute the operational facilities.

A comparative analysis of the buildings indicates the probability of an interferometer. Southeast of the Housing Area is the probable location of the interferometer. It has the secondary function of providing microwave communication. The size of the site indicates that the primary function requires many more people than a microwave installation would warrant. Owing to the poor detail in this area, all mensural data and many identifications are to be considered approximate. Facilities include a guyed mast with crossarms which support microwave antennas, a housing facility, an abandoned athletic field, and an unidentified facility or ground pattern (see Figure 48).

The microwave tower is in a fenced compound which measures 600 by 575 feet and contains two major buildings. The tower is approximately

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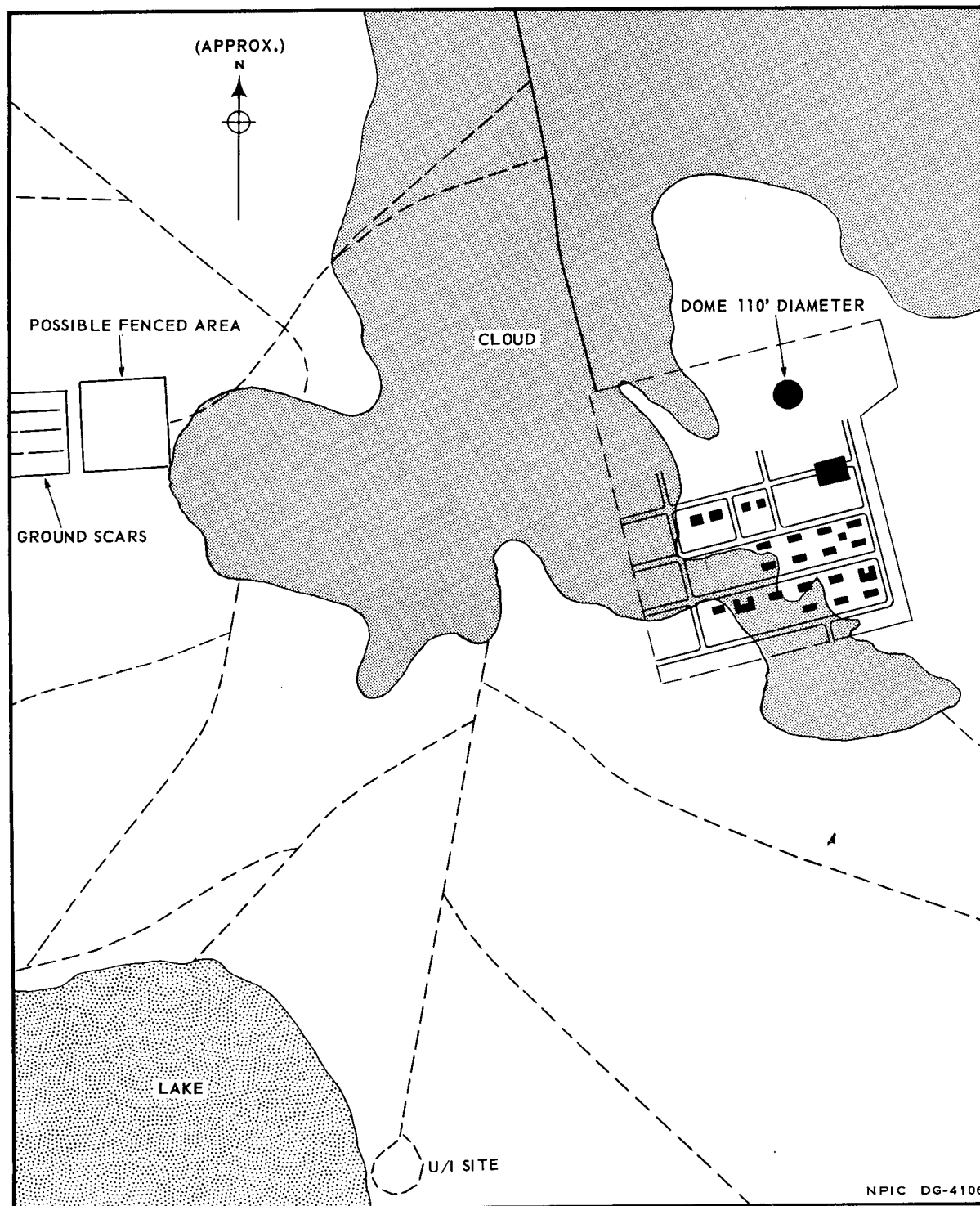


FIGURE 46. INSTRUMENTATION SITE 6. The dome may be a Luneberg lens or may house more conventional radar equipment.

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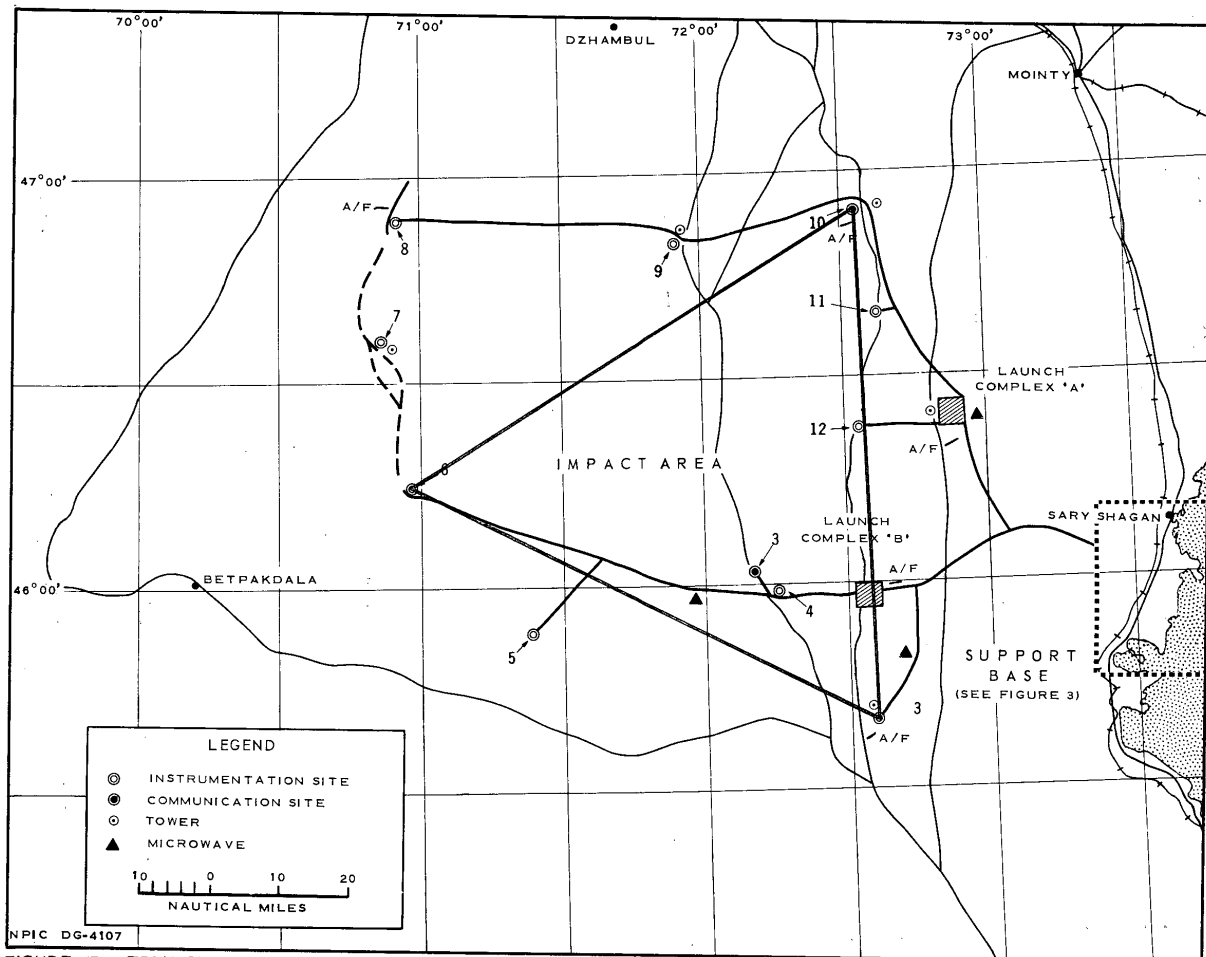


FIGURE 47. TRIANGULAR PATTERN FORMED BY INSTRUMENTATION SITES 3, 6, AND 10. These three sites may operate as one high-resolution tracking system.

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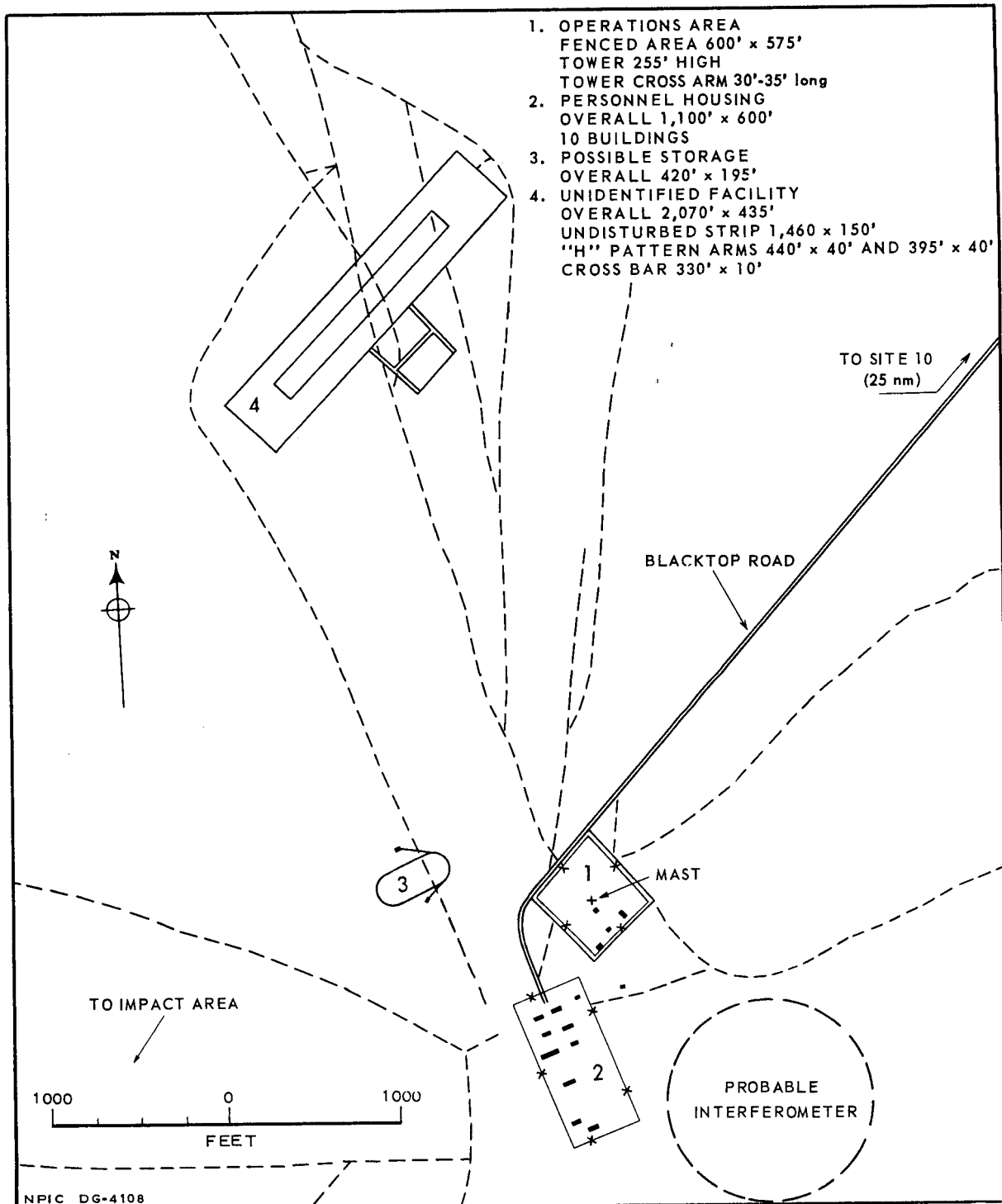


FIGURE 48. INSTRUMENTATION SITE 9. This site provides microwave communication, but its primary function is probably interferometer instrumentation.

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255 feet high. The housing area is fenced and includes ten buildings with an estimated floor space of 32,000 square feet. Approximately 1,000 feet northwest of the housing area is an athletic field which either has been abandoned or is being used for open storage.

The unidentified facility is a plowed and/or leveled strip 2,070 by 435 feet with an undisturbed strip in the center 1,460 by 150 feet. There are a number of unidentified objects in the vicinity, including an H-shaped plowed/cleared/paved pattern contiguous to the unidentified strip.

LOCATION OF MAJOR FACILITIES

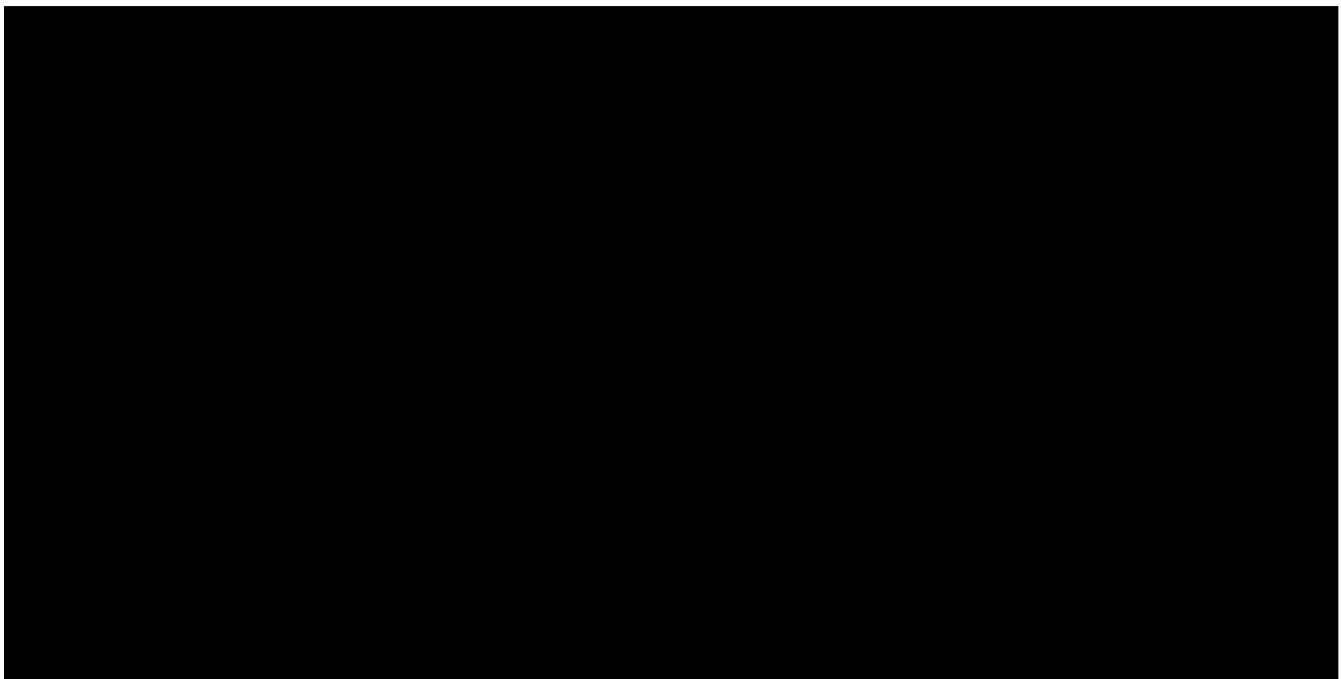
Airfield	46-02N 73-30E
Dirt Strip	45-56N 73-27E
Communications Site 1	46-03N 73-36E
Communications Site 2	45-54N 73-37E
Communications Site 3	46-02N 72-09E
Radar Site 1	45-59N 73-39E
Radar Site 2	45-56N 73-38E
Instrumentation Site 1	45-54N 73-38E
Instrumentation Site 2	45-48N 73-35E
Instrumentation Site 3	45-40N 72-34E
Instrumentation Site 4	45-58N 72-16E
Instrumentation Site 5	45-51N 71-23E
Instrumentation Site 6	46-15N 70-58E
Instrumentation Site 7	46-36N 70-50E
Instrumentation Site 8	46-54N 70-55E
Instrumentation Site 9	46-50N 71-55E
Instrumentation Site 10	46-55N 72-34E
Instrumentation Site 11	46-39N 72-37E
Instrumentation Site 12	46-24N 72-34E
Launch Complex A	46-23N 72-52E
Launch Complex B	45-59N 72-33E

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REFERENCES

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